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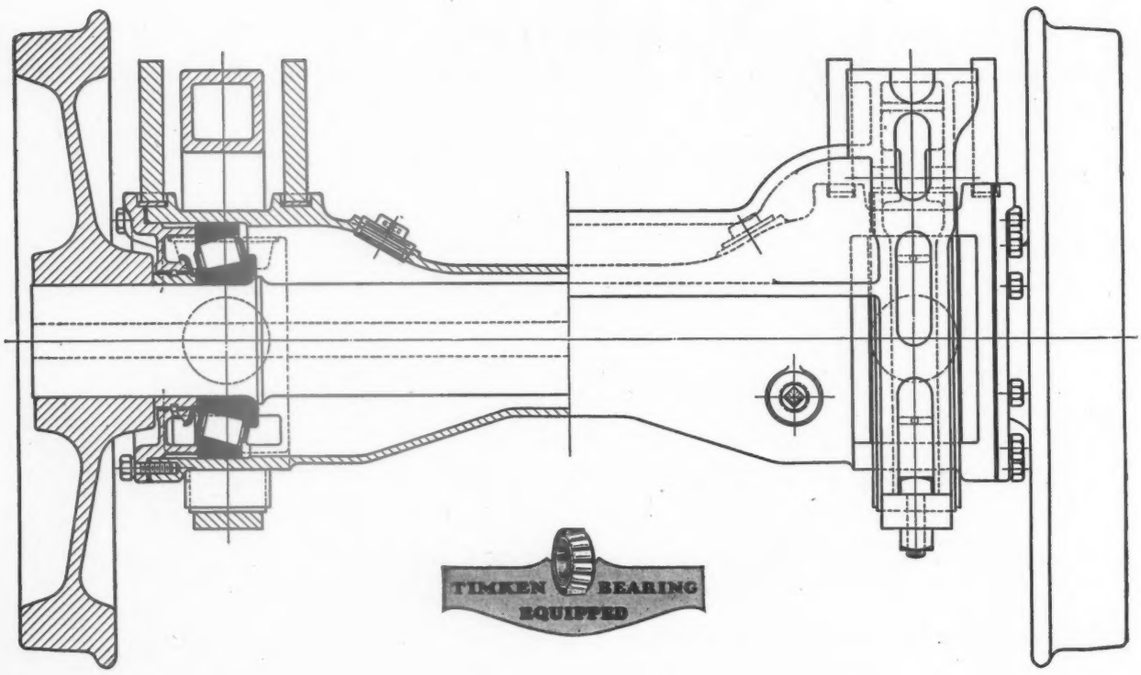

To The Men In Charge of Locomotive Design and Maintenance

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Railway
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May, 1930

"Yankee Clipper" Train of the New Haven

Seven-car trains equipped with roller bearings—Dining cars have mechanical refrigeration

FOURTEEN cars built by the Pullman Car & Manufacturing Corporation, Chicago, are used in the two de luxe trains which were placed in service, March 18, 1930, by the New York, New Haven & Hartford between New York and Boston, Mass. These trains, which are known as the "Yankee Clipper," leave New York and Boston simultaneously at 3:30 p.m., and arrive, via the Shore Line, at their destination at 8:15 p.m., making a total time for the run in either direction of 4 hr. 45 min.

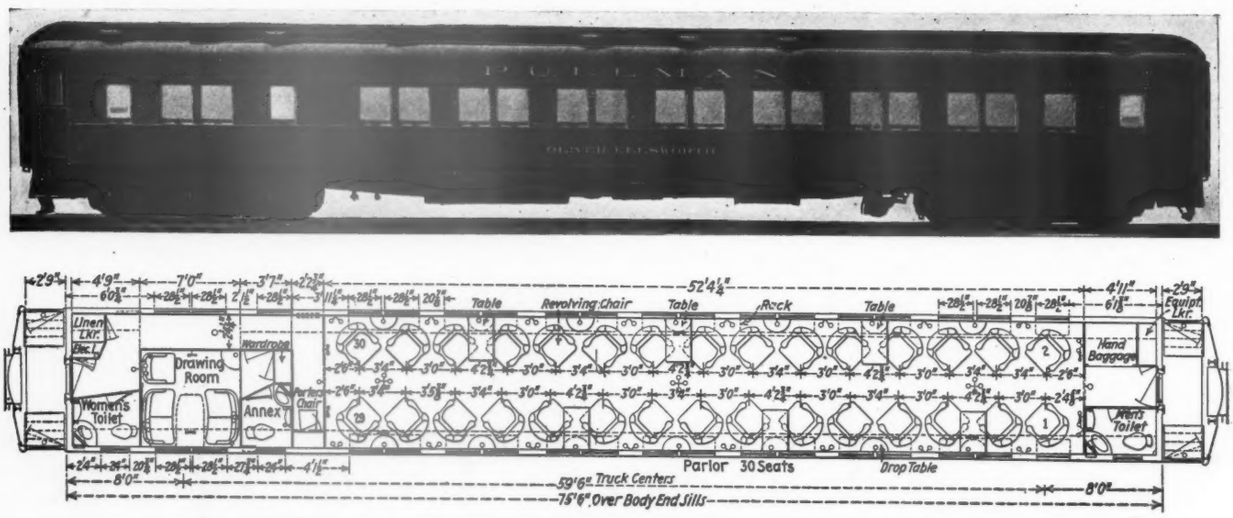
The two trains of seven cars each are completely equipped with American Steel Foundries' roller bearing units having Timken bearings. In addition to the 14 cars used on the "Yankee Clipper," the 14 cars used on the "Merchants Limited" of the New Haven are equipped with these roller bearing units, making a total of 28 cars equipped with roller bearing units having Timken bearings in de luxe train service between New York and Boston. It is reported that the New Haven will have, including passenger equipment now in service and on order from builders, approximately 165 cars equipped with American Steel Foundries' roller bearing units having Timken or Shafer roller bearings.

Mechanical Refrigeration on the Dining Cars

The twelve parlor, club and observation cars were built by the Pullman Car & Manufacturing Corporation for the Pullman Company and the two dining cars were built for the New Haven. The latter is equipped with Frigidaire, which was designed by the General Motors Corporation and installed under the direction of F. A. Roberts, manager, commercial department, Stover Corporation, 151 North Michigan avenue, Chicago. In addition to the two dining cars used on the "Yankee Clipper," eight other dining cars and one business car are being equipped with Frigidaire for the New Haven.

Interior of one of the Pullman parlor cars

The refrigerating equipment on the dining cars for the "Yankee Clipper" includes one pantry refrigerator, 54 in. long by 24 in. wide by 99 in. high; one pantry chill box, 96 in. by 34 in. by 22 in.; one beverage cooler, 33 in. by 28 in. by 41 in.; one kitchen storage refriger-



Pullman drawing-room-parlor car and floor plan—Parlor seating capacity for 30 persons

ator, 38 in. by 36 in. by 88½ in.; and one kitchen chill box 79 in. by 26 in. by 37 in. The pantry chill box has one compartment for the storage of ice cream, one milk compartment, a dry storage space and a compartment with a capacity to freeze 654, 1½-in. cubes of ice per freezing in approximately four hours. The beverage cooler is designed for chilling bottled goods of all kinds. One 24-in. section of the kitchen chill box is provided for the storage of fish. This box also has a dry storage compartment about 3 ft. long for the storage of cut up, short-order meats, etc. In one end of the kitchen chill box, a can is provided for the storage of bulk milk.

All the refrigerators are operated from two compressors of 1½-hp. maximum input. Electric power is secured from two Exide batteries of 600 amp. hr. capacity, located under the car and charged by two 5-kw. generators driven from the car axles. The compressor motors, one for each compressor, are of special design for operation on voltages varying between 26 and 35 volts. The two batteries furnish power for lights, fans and mechanical devices. A double-throw knife switch is cut in between the two batteries so that either one or both may be used, as desired.

Each item of refrigeration equipment has a pilot light to indicate when it is in operation. All control switches are operated from a switchboard panel concealed in the car walls. The cooling units are all of the full-flooded direct expansion fin-type, in order to give a maximum radiating surface and keep the hy-

Kitchen end of one of the New Haven dining cars

List of Special Appliances, Equipment and Materials Used on the New Haven "Yankee Clipper" Dining Cars

Railroad	New York, New Haven & Hartford
Builder	Pullman Car & Manufacturing Corp.
Number built	2
Air brakes	Westinghouse, schedule UCB-2-16
Axle lighting equipment	Safety
Batteries	Exide MVAH-33, 16 cells each, 600 amp.
Bearings, side	Miner, single-roller
Bolsters and platforms	Commonwealth, combined cast steel
Bolster locking center pin	Miner
Brake shoes	American Brake Shoe & Foundry
Brakes	Simplex clasp
Brakes, hand, kitchen end	Miner
Buffer mechanism, upper	Fowler
Buffing device	Miner, Class B-10-X
Charging receptacles	Pyle-National, BCRa-100
Connectors, train	Pyle-National
Curtains, vestibule	Adams & Westlake
Diaphragms, canvas	Adams & Westlake Rex. 2-fold
Doors, steel (End, kitchen, pantry and passageway side doors)	Morton Mfg.
Draft gear	Miner, Class A-5-XB
Drawbars and yokes	American Steel Foundries
Dust guards	Chaton Fibre
Fans, bracket and exhaust	Safety
Flooring, metal	Chanarch
Flooring	Flexolith
Heating system	Vapor
Insulation	Salamander
Journal boxes	Pullman
Lighting fixtures	Safety
Locks, end door	James L. Howard Co.
Range and steam table	Stearnes
Refrigeration	Frigidaire (Stover Co.)
Refrigerators	Pullman
Roller-bearing units	American Steel Foundries (Timken)
Sash, window, including fixtures	O. M. Edwards
Shade fixtures and rollers	National Lock Washer
Springs, truck	Railway Steel Spring
Signal equipment	Westinghouse
Slack adjuster	Westinghouse
Switchboard	Safety
Trucks	Commonwealth, six-wheel cast steel
Ventilators	Garland
Water filter	Boston Filter Co.

dration at a minimum. Refrigerant lines are run from the coil headers in solid conduit to the compressor inlets. All temperatures are governed automatically and were set by Frigidaire inspectors before formal acceptance of the cars by the railroad.

Interior Design and Decoration

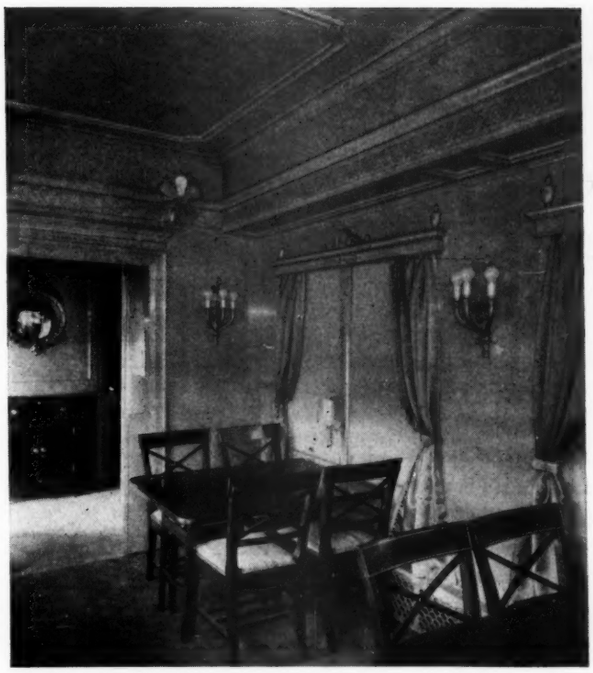
The cars are of all-steel construction with dummy ends and wide upper deck or clerestory. In line with the traditional thought which lead to naming the train the "Yankee Clipper," the interior scheme of decoration in all of the cars follows the Colonial design. Each car is named after a clipper ship which was well-known in the days when much of the ocean-going commerce of New England was carried in sailing vessels of that design. A reproduction of an authentic painting of the ship after which the car is named is hung on the end wall near the entrance to the lounge or parlor compartment of each car.

Double windows are used in the dining cars, but a specially designed window header gives the effect of a much higher type than is usual. This window header is of Colonial type with an urn at either end and with a dolphin and shell design in the center, the latter being a rather nautical design to be in keeping with the name of the train "Yankee Clipper." Small decorative castings are placed on the mouldings over the windows and over the doors.

The ceiling is a Colonial type with panelled effect. The walls and bulkheads are painted a cool shade of blue green and the ceiling is painted in a color which is a few shades lighter than the walls but of the same general tone. The decorative castings, urns, shell and dolphin and the other smaller types are finished in a dull gold and contrast effectively against the wall color.

The buffet part of the dining car is on a more decorative scale. The buffet is a copy of an old Colonial design and is of Cuban mahogany, inlaid with satin wood. A round convex Colonial mirror in a dull gold frame with a golden eagle at the top of the mirror is placed in the panel over the buffet, giving an unusual and artistic treatment to this part of the car.

Illumination in the dining room comes from especially designed three-light brackets finished in dull gold, placed in each of the pier panels and on each bulkhead on either side of the door opening. In addition to these fixtures, a small one-light bracket is placed over the tables in the small pier between each window. No ceiling lights are used.



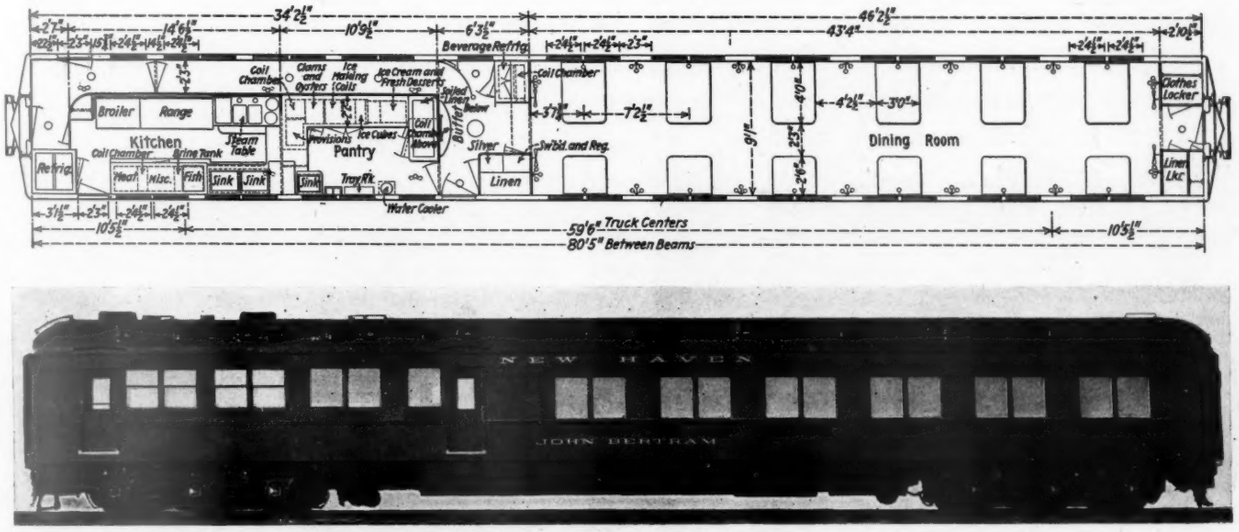
The dining car—The buffet with the Colonial girandole is shown at the left

Interior Furnishings of the New Haven Dining Cars

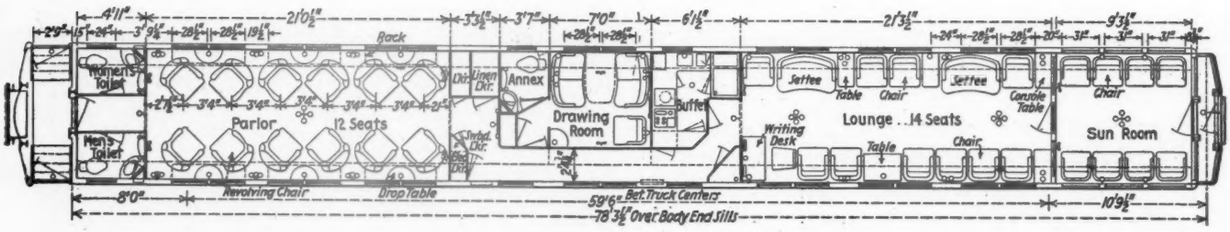
Carpet is used in the dining room and is of a blue ground color with small gold rosettes or medallions forming the pattern. The blue forms the color background for the room and for the other furnishings.

The dining room chairs, of mahogany, are upholstered in a blue and tan jaspe figured moquette and the window shades are a special silk-faced material of a straw-colored ground with a blue flower forming the pattern.

Draperies are applied to the windows and are full-



New Haven dining car and floor plan



Floor plan of the observation car

length, reaching from the window header down to the heater pipe grill. A new type of concealed drapery rod has been designed and the window header forms a curtain cornice making a more attractive appearance than usual. Cast metal tiebacks are used in place of the usual type and these are designed to be in harmony with the other fittings in the car. The material is a dark blue silk and wool fabric and is lustrous in appearance, making a striking effect.

Interior Furnishings of the Pullman Cars

Two tones of blue-green and tan form the prevailing color for the walls and ceilings of the other cars in the train. The carpet laid on the floors of the observation and parlor cars has a large medallion figure and is of a blue and tan shade which harmonizes with the general scheme of interior decoration. The carpeting in all 14 cars is laid over Ozite mats.

The observation and club lounge cars are furnished with comfortable armchairs and settees upholstered in blue Morocco leather and blue moquette which gives the interior a comfortable and attractive appearance. The parlor cars are equipped with overstuffed revolving chairs of special design, having a pedestal by means of which the chair moves longitudinally 3⅞ in. when revolved. This feature is necessary on account of the close proximity of the chairs to the side tables. Green mohair in various patterns supplies the motif for the parlor-lounge car, with blue decorative tapestry for the drawing room. Rattan easy chairs finished in green Morocco leather have been placed in the sun room of the observation car.

All the 14 cars are heated by the Vapor system, with thermostatic temperature control. The heating pipes are of the Vapor fin-type, and in the Pullman cars are recessed in the side walls and concealed by an ornamental grill. The platform construction of the Pullman cars is the owner's standard, having short cast steel buffer castings and built-up frames. The trucks under the cars are Pullman standard 2411-R, having an 11-ft. wheel base with General Steel Castings Company cast steel frames.

Design and Construction

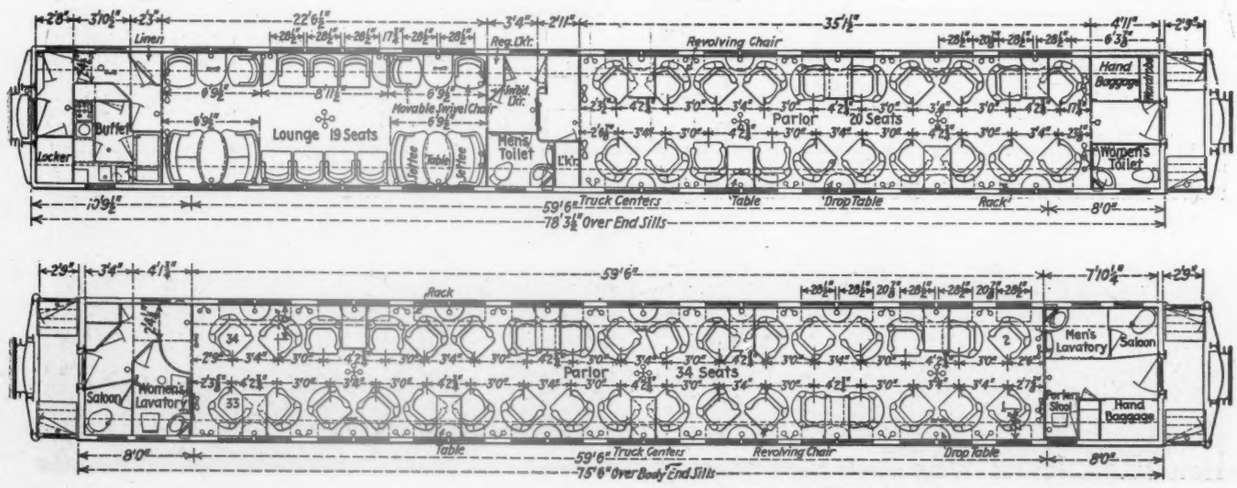
All the Pullman cars, except the observation cars, have compartments with shelves at the end of the parlor for storing baggage. There are no drop deck sash. The usual openings are provided, but are covered with an ornamental grill, back of which are located the exhaust fans and ventilators. These cars have the new Pullman standard wide-deck construction which is now used in all its cars except sleepers.

The provision of a special toilet in the wash room annex of the observation car is an innovation for this type of equipment. Porcelain washstands are provided throughout. There are two buffets on each train, the first and last cars, each of which is equipped with a soda fountain, including all facilities such as drink mixers, fruit juice extractors, coffee urns, etc. Telephone service is provided in the observation room.

Ventilation is provided by Pullman exhaust ventilators and electric exhaust fans in all cars. In the buffets and wherever smoking is permitted, the exhaust fans are connected to a relay and are automatically shut off at a train speed of 20 m.p.h., starting again when the train speed is reduced to that rate.

Construction of the Dining Cars

A list of the special equipment and materials used in the construction of the dining cars is shown in the table. Both cars are equipped with Commonwealth integral cast steel platforms and body bolsters. The trucks are also of Commonwealth six-wheel design, having inside side bearings and straight-top equalizers.



Floor plans of two of the Pullman cars; Top—The parlor-lounge-buffet car; Bottom—The parlor car

The insulation consists of single course of three-ply Salamander to all outside surfaces with an additional course of two-ply Salamander back of the steel ceiling

The pantry—The cabinet in the background and the lockers at the left are equipped with Frigidaire

sheets. The interior finish is entirely of steel with the exception of the buffet. The kitchen and pantry is finished with Monel metal on all exposed surfaces except the upper deck. Sash are of the double brass type and are provided for all windows, except in the kitchen and pantry. The heating pipes are in a single tier along each side of the car. Ventilation is had by means of 12 exhaust ventilators with intake openings suitably disclosed. The kitchen and pantry are provided with five exhaust fans in the side deck. Two trap ventilators are located in the upper deck of the kitchen. Four bracket fans are provided in the dining room to aid in air circulation.

The refrigerators and ice boxes are of Pullman manufacture to suit the special requirements of electric refrigeration and are lined throughout with Monel metal. Three-inch thick cork is used as insulating material in all the refrigerators and ice boxes.

Lighting is obtained by means of the usual axle device and 5-kw. generators and 600 amp. hr. capacity storage batteries. Two generator and battery equipments are employed to light the cars and to provide current for electric refrigeration and are operated independent of each other. Connections are provided at the switchboard, however, so that either of the equipments may be used for the lighting system or refrigerating plant as may be desired.

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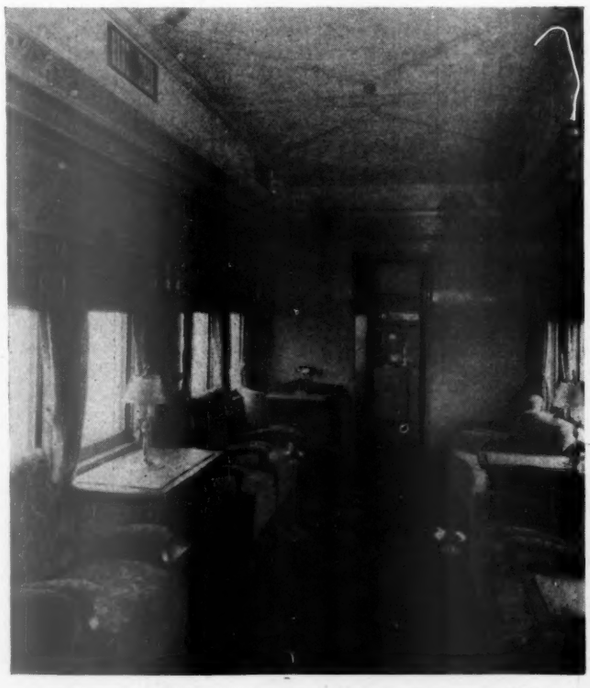
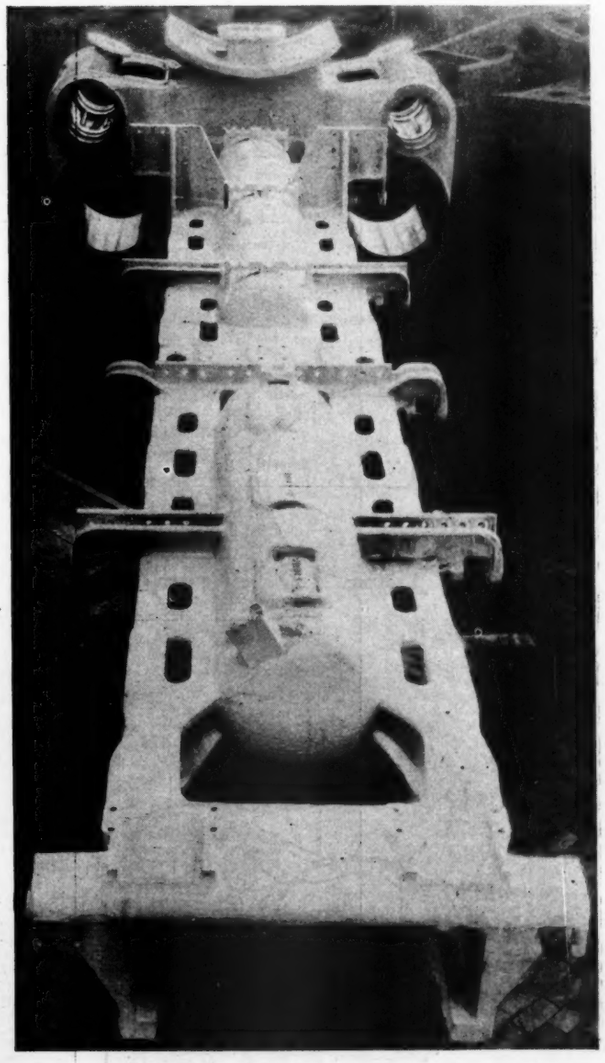
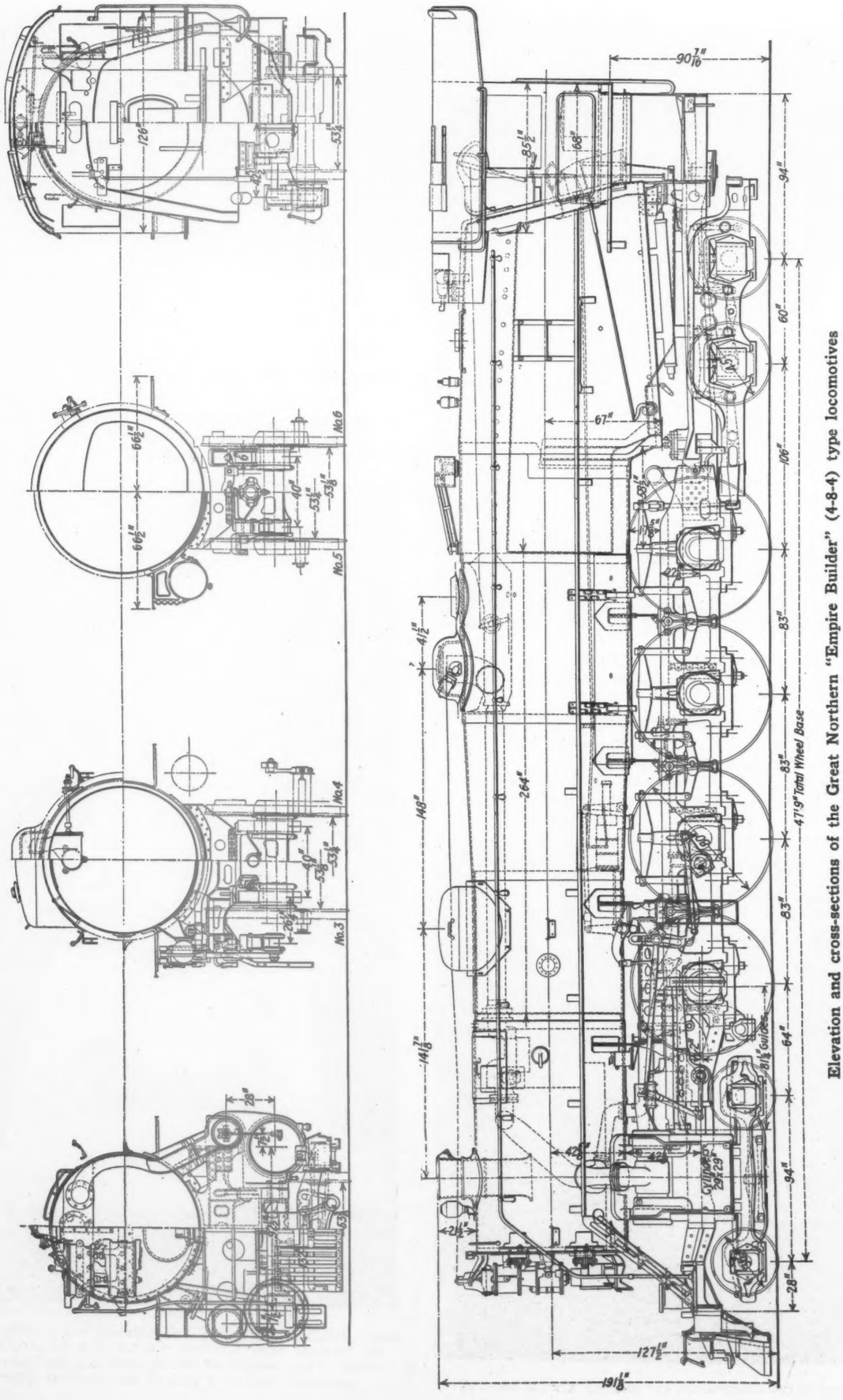


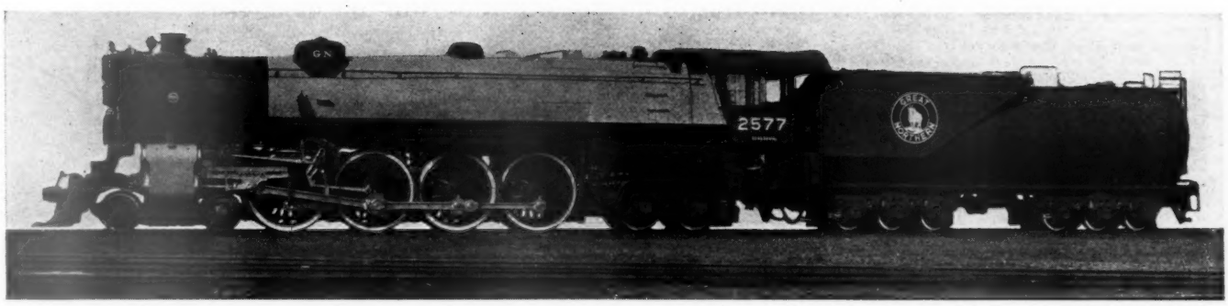
Lounge of the observation car looking toward the buffet



Union Pacific integral 2-10-2 locomotive bed casting built by the General Steel Castings Corporation which is 36 ft. 7 in. long, weighs 52,250 lb. and has the main air reservoirs cast as a part of the cross-tie system



Elevation and cross-sections of the Great Northern "Empire Builder" (4-8-4) type locomotives



"Empire Builder" (4-8-4) type locomotive built for the Great Northern by the Baldwin Locomotive Works

Great Northern Buys 4-8-4 Type Locomotives

Built with 80-in. drivers and designed for tractive force of 58,300 lb.—To be used in deluxe passenger service.

THE Great Northern recently placed 14 4-8-4 type locomotives in through-passenger service on its deluxe trains such as the "Empire Builder" and the "Oriental Limited." These locomotives, which were built by the Baldwin Locomotive Works and named by the railroad the "Empire Builder" type, are being used between Spokane, Wash., and Wenatchee and also in the same service over the Montana division between Williston, N. D., and Havre, Mont.

The maximum rated tractive force of one of these locomotives is 58,300 lb. They have 80-in. driving wheels, 29-in. by 29-in. cylinders, and the boiler operates at a working pressure of 225 lb. The total weight of the engine is 420,900 lb., of which 247,300 lb. is carried on the drivers. The factor of adhesion is 4.24. Other weights, dimensions and proportions are given in one of the tables.

It will be noted from the illustration showing locomotive No. 2577, that the new passenger power presents an attractive appearance. The covers of the cylinder and steam chest heads are chromium plated and the side rods are polished. The jackets of the boiler and the cylinders are finished with aluminum paint.

The boilers are of ample proportions and are of conical design instead of Belpaire, which has heretofore been standard for the Great Northern. This design was adopted and also nickel steel construction, with the

Baldwin constant-resistance equalized engine truck

Table Showing the Principal Weights, Dimensions and Proportions of the Great Northern "Empire Builder" (4-8-4) Type Locomotives

Railroad	Great Northern
Builder	Baldwin Locomotive Works
Type	4-8-4
Service	Passenger
Cylinders, diameter and stroke	29 in. by 29 in.
Valve gear, type	Walschaert
Valves, piston type, diameter	14 in.
Maximum travel	7½ in.
Weights in working order:	
On drivers	247,300 lb.
On front truck	78,000 lb.
On trailing truck	95,600 lb.
Total engine	420,900 lb.
Total tender	326,900 lb.
Total engine and tender	747,800 lb.
Wheel bases:	
Driving	20 ft. 9 in.
Rigid	13 ft. 10 in.
Total engine	47 ft. 9 in.
Total engine and tender	91 ft. 2 in.
Wheels, diameter outside tires:	
Driving	80 in.
Front truck	36 in.
Trailing truck	45 in.
Journals, diameter and length:	
Driving, main	13 in. by 14 in.
Driving, others	11½ in. by 14 in.
Engine truck	7½ in. by 14 in.
Trailing truck	9 in. by 14 in.
Boiler:	
Type	Conical
Steam pressure	225 lb.
Fuel, kind	Oil
Diameter, first ring, inside	84 in.
Firebox, length and width	138 in. by 102 in.
Combustion chamber, length	60 in.

Tubes, number and diameter	38—2¼ in.	
Flues, number and diameter	195—3½ in.	
Length over tube sheets	22 ft.	
Grate area	97.7 sq. ft.	
Heating surfaces:		
Firebox	268 sq. ft.	
Combustion chamber	111 sq. ft.	
Tubes and flues	4,402 sq. ft.	
Total evaporative	4,781 sq. ft.	
Superheating	2,265 sq. ft.	
Combined evap. and superheating	7,046 sq. ft.	
Tender:		
Style	Vanderbilt	
Water capacity	17,000 gal.	
Oil capacity	5,800 gal.	
Rated maximum tractive force	58,300 lb.	
Weight proportions:		
Weight on drivers ÷ total weight engine, per cent		58.7
Weight on drivers ÷ tractive force		4.24
Total weight engine ÷ combined heating surface		59.8
Boiler proportions:		
Tractive force × diameter drivers ÷ comb. heat surface		663
Firebox heat. surface ÷ grate area		3.88
Firebox heat. surface, per cent of evap. heat. surface		7.93
Superheating surface, per cent of evap. heat. surface		47.4
Tractive force ÷ comb. heat. surface		8.28

object of reducing the weight of the locomotive. The boiler equipment includes type E superheaters and Sellers exhaust steam heater injectors. It has 195, 3½ in. superheater flues and 38, 2¼ in. tubes. The outside diameter of the first course is 84 in. which increases to 94 in. at the combustion chamber. The boiler is provided with four 2½ in. safety valves which open consecutively at 225 lb., 226 lb., 227 lb. and 228 lb., respectively. The smokebox is 135 in. long and has an inside diameter of 83 ⅜ in. All of the auxiliaries with the exception of the two 8½ in. air compressors are operated with saturated steam. The air compressors are located on the front of the smokebox to facilitate making the connections to the superheater headers.

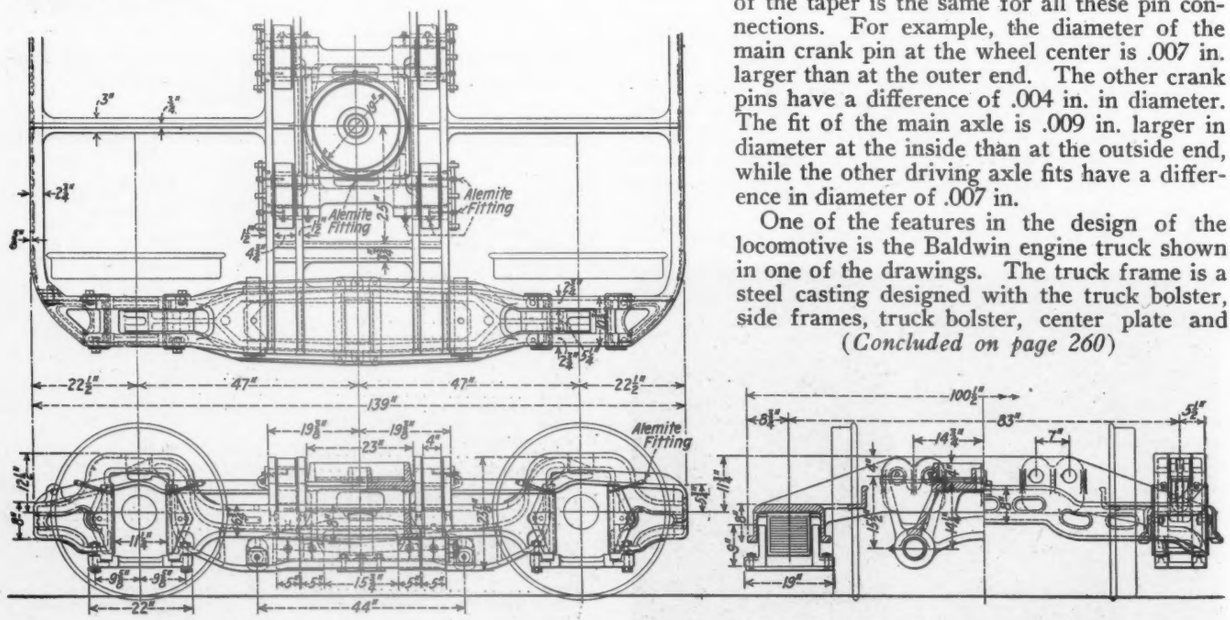
List of Special Parts, Appliances and Equipment Applied on the Great Northern "Empire Builder" (4-8-4) Type

Railroad	Great Northern
Builder	Baldwin Locomotive Works
Number built	14
Firebox and boiler:	
Blower	Hancock
Blow-off cocks	Okadee
Boiler and firebox steel	Otis Steel Co.
Boiler checks	Hancock
Boiler lagging	Johns-Mansville
Firedoor flange	O'Connor
Injector	Sellers
Injector, exhaust steam heater	Sellers
Low water alarm	Nathan
Oil burner	Von Boden
Safety valves	Consolidated
Smokebox hinges	Okadee
Staybolts, flexible	Alco
Staybolts, hollow	Falls
Steam gage	Ashcroft
Steam heat valve	Vapor
Superheater	Type E
Throttle	American, multiple type
Tubes and flues	National
Tubes and flues	Globe
Cylinders and running gear:	
Cradle	Commonwealth
Cylinder safety valve	Okadee
Driving box grease cellars	Franklin
Driving box, lateral motion	Franklin
Truck, trailing	Delta
Packing	U. S. Metallic
Power reverse gear	Barco
Springs	American Spiral Spring
Tires, driving	Edgewater
Valve gear	Walschaert
Wedges, pedestal	Franklin
Cab and miscellaneous:	
Air brakes	New York
Bell ringer	Simplicity
Coupler, tender	Buckeye
Drawbar	Franklin
Headlight case	Golden Glow
Headlight generator	Pyle-National
Lubrication	Alemite
Lubricator, flange	Detroit
Lubricator, hydrostatic	Detroit
Lubricator, mechanical	Detroit
Sanders	King type
Speed recorders	Boyer
Wiring	Okonite
Tender:	
Buffer, radial	Franklin
Brake shoes	American Brake Shoe & Foundry
Brakes, clasp	American Steel Foundries
Journal boxes	Symington
Side bearings	Wood
Coupler, rear	Buckeye
Dust guards, journal box	Protecto
Frame	Commonwealth
Tank water hose	Goodyear
Draft gear	Miner

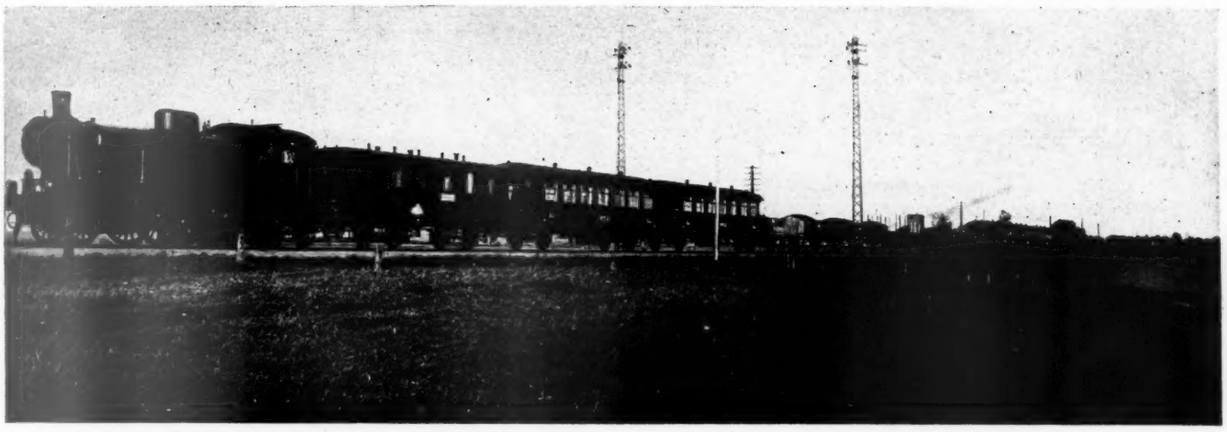
Other equipment on these locomotives includes Barco power reverse gears, Commonwealth cast-steel cylinders, and American multiple type throttles. Alemite lubrication is provided for the engine-truck rockers, center plate, pedestals, and other bearing parts. This type of lubrication has been applied to the valve-motion bearings, shoes and wedges, spring rigging, brake gear and tender-truck center plates. The railroad company's standard grease cups have been applied at the rod connections. All the crank pins and axle fittings have been tapered slightly in order to avoid any abrasion which usually takes place with straight fits. The angularity of the taper is the same for all these pin connections. For example, the diameter of the main crank pin at the wheel center is .007 in. larger than at the outer end. The other crank pins have a difference of .004 in. in diameter. The fit of the main axle is .009 in. larger in diameter at the inside than at the outside end, while the other driving axle fits have a difference in diameter of .007 in.

One of the features in the design of the locomotive is the Baldwin engine truck shown in one of the drawings. The truck frame is a steel casting designed with the truck bolster, side frames, truck bolster, center plate and

(*Concluded on page 260*)



Baldwin constant-resistance equalized engine truck as applied to the Great Northern "Empire Builder" (4-8-4) type locomotives



Test train on the Swedish State Railways equipped with the Transit brake

Transit Air Brake Tested on Swedish State Railways

Satisfactory results reported from tests in freight and passenger service— Operated with Kunze-Knorr brake

DYNAMOMETER tests of the Transit air brake in both freight and passenger service on the Swedish State Railways and several privately owned roads in Sweden showed that the brake operated satisfactorily in trains completely equipped with the Transit brake and also when mixed with cars having other brake equipment, such as the Kunze-Knorr. The braking power was sufficient to stop the test train, shown in one of the illustrations, within the requirements established by the Swedish State Railways. These requirements allow a maximum braking distance of 2,297 ft. from a speed of 31 m.p.h. It was shown in the tests that this requirement could be met from a train speed of over 37 m.p.h. The test train had a total weight of about 2,200 tons, and consisted of 83 cars, including the dynamometer car. A total of 188 axles were braked in the train.

Further authenticated reports of the road tests stated that the tests were made without accident or damage, that all stops were made in a satisfactory manner, and that the braking efficiency could be gradually controlled as well during application as during release.

The dynamometer car

The Transit Brake

The Transit air brake is patented by Carl A. Holmberg, mechanical engineer, Verkstads Aktiebolag, Lund, Sweden. The manufacturers of this brake, which is known as the Transit system, Holmberg-Anderberg patent, are represented in this country by B. G. Brolinson, 25 Broadway, New York.

This air brake is an automatic brake which can be operated by the usual type of engineman's valve such as the Westinghouse Type H-6 or G-6. It will be noted from the following description that it is designed to act at different brake pipe pressures and full braking effect is obtained, when using a normal service pressure of 72.5

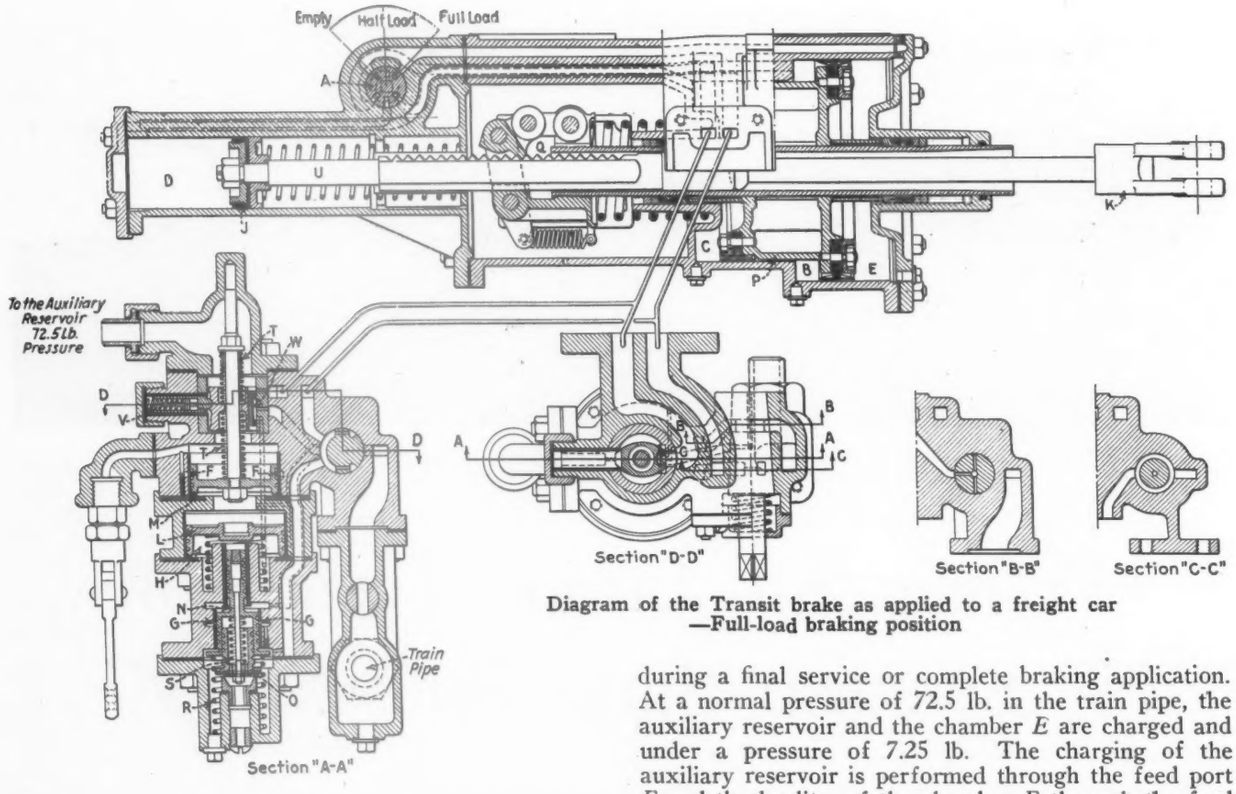


Diagram of the Transit brake as applied to a freight car —Full-load braking position

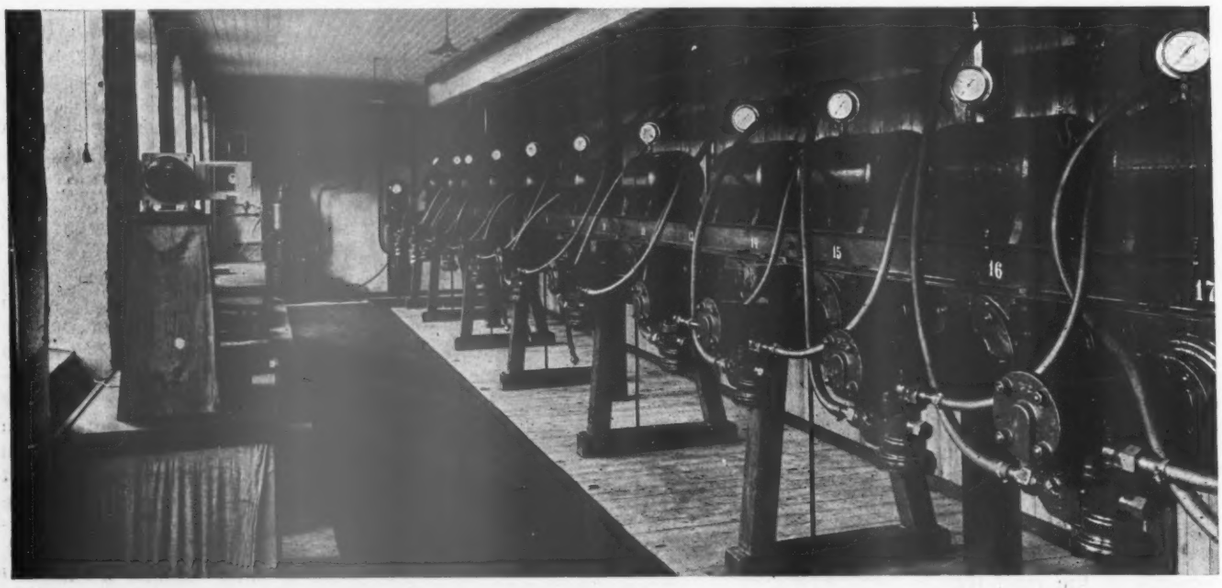
lb., by decreasing the pressure in the brake pipe by 21.8 lb.

Referring to the drawing of the equipment as applied to a freight car, it will be noted that the brake has an empty and load feature. This is secured by means of a valve *A* the handle of which can be placed in any one of three positions; namely, empty, half-load and full-load. This valve controls the supply of compressed air to the brake cylinders at *B*, *C* and *D*. These three chambers are opened to the atmosphere, through the control valve *A*, during the periods of charging or release.

The drawing shows the position of the various parts during a final service or complete braking application. At a normal pressure of 72.5 lb. in the train pipe, the auxiliary reservoir and the chamber *E* are charged and under a pressure of 7.25 lb. The charging of the auxiliary reservoir is performed through the feed port *F* and the loading of the chamber *E* through the feed port *G*.

When the brake is released, the pressure transfer cavity *H* in the control valve, is also charged by the train pipe pressure.

Service braking is performed by means of a moderate decrease in pressure in the train pipe. Thus the pressure in the auxiliary reservoir is transmitted through the control valve *A* to the advancing cylinder *D* and thence to the cylinder chambers *B* and *C*. The admitting of the auxiliary reservoir pressure into the advancing cylinder *D* forces the piston *J* and the cross head *K* to the right, and transmits the movement by



Laboratory test rack with the Transit brake

means of the brake rigging to the brake shoes. This advancing movement of the brakes shoes occurs rapidly.

The decrease in pressure in the train pipe and in the pressure transfer cavity *H* is secured direct to the atmosphere. The acceleration piston *L* is brought to the bottom position by means of the train pipe pressure. The stroke volume of the acceleration piston corresponds to a little more than the stroke volume of the valve piston *M*, so that the decrease in pressure is rapidly propagated throughout the train to the last car.

The emptying of the transfer cavity *H* relieves the central portion of the piston slide *N*, and thus the connection between the function chamber *E* and the train pipe by means of the ports *G* is broken. Instead a connection is established between the function chamber *E* and the atmosphere past the valve portion *O*. This decrease in pressure in the function chamber *E* is sufficient to cause the brake piston *P* to be moved sufficiently to the right so that the clutch pawl *Q* engages with the toothed rack *U*.

The functions described in the preceding paragraphs; namely, the application of the brake shoes against the wheels by means of the advancing piston *J* and the movement of the brake piston *P* into braking position

Recording apparatus in the dynamometer car

are performed at a decrease in pressure in the train pipe amounting to approximately 4.35 lb.

If the decrease in pressure in the train pipe has been reduced further than 4.35 lb. the helical springs *R* and *S* in simultaneous action with the pressure within the function chamber *E* will carry the piston slide *N* up, and thus the air in the function chamber will come into communication with the atmosphere past the valve portion *O*. The effect of the helical springs *R* and *S*, and the decrease in pressure in the function chamber *E* will be greater than the decrease in pressure in the train pipe. When an equilibrium is established between the pressure in the train pipe and that in the function chamber (in addition to the pressure of the spring *R*) the connection between the function chamber *E* and the atmosphere is broken, and in such way the braking power may be gradually increased up to full braking.

When the pressure within the train pipe has been decreased by 21.8 lb., the pressure in the function chamber *E* has been reduced to atmosphere. Hence, full braking is obtained for a decrease of pressure within the train pipe amounting to 21.8 lb.

If the engineman's valve handle is moved to emergency braking position, the pressure in the train pipe is quickly reduced. The braking impulse is rapidly propagated through the train to the last car and a full braking effect is obtained. The same function is also obtained in case an emergency brake application is made at the conductor's vale or the train line is broken on any car in the train.

The releasing of the brake, whether complete or partial, is obtained by an increase of pressure in the train pipe. Thus the pressure in the train pipe will overcome both the pressure in the function chamber *E* and the pressure of the springs *R* and *S*. The piston slide *N* is forced down so that a connection is established between the train pipe and the function chamber by means of the feed port *G*. When an equilibrium has been reached again, this connection is broken, and the braking effect has been reduced to correspond to the increase in pressure within the function chamber. Thus it is also possible to gradually reduce the braking effect.

The adjustment of the piston power for braking of an empty, half loaded or fully loaded car is obtained by the manipulation of the turntable reversing slide valve *A*. If the braking power is to be adapted to an empty car, the reversing valve *A* connects the working chamber *B* with the advancing cylinder chamber *D*. The work chamber *C* is then connected with the function chamber *E*. When braking, the piston area facing the chamber *B* will thus be acting alone.

The adjustment of the braking power for a half loaded car is obtained in such a manner that the reversing valve *A* is caused to establish a connection between the chambers *C* and *D*, and between the function chamber *E* and the chamber *B*. Hence, when braking, the piston area facing the chamber *C* will only be acting.

If the full load capacity of the car together with the light weight are to be braked, the reversing valve *A* is shifted into the full-load position. Thus a communication is established between the chambers *B* and *C* on the one side and the advancing cylinder chamber *D* on the other side. Therefore, when braking, both of the piston areas facing the chambers *B* and *C* are used. A suitable transmission gear may be applied to the valve *A* so that it may be manipulated from either side of car.

In service braking the valve piston *M* is forced down by pressure from the auxiliary reservoir. The upper spring *T* acquires sufficient power to overcome the resisting action of the device *V*. Thus the valve slide *W* is moved over so that it admits auxiliary pressure to the advancing cylinder *D*. In the concluding stage of the service braking operation, the slide *N* moves to a counter-balanced position. To release the brakes, the piston *M* accumulates sufficient force to lower the spring *T*, until this force is sufficient to overcome the arresting action of the device *V*. In this manner the movement of the slide *W* is reversed so as to connect the advancing chamber *D* with the atmosphere. Simultaneously with this action, the pressure transfer cavity *H* is filled with air from the train pipe.

A NEW USE was found for a locomotive recently when a large structure was moved to a new location with the assistance of one of the large engines of the Northern Pacific. The unusual operation was carried on in the yards at Laurel, Mont., where the railway company is completing extensive improvements and enlargements. An ice house, 250 ft. long by 40 ft. wide and 40 ft. high, first was moved across one of the yard tracks and then hitched to a locomotive and pulled nearly half a mile to a new location.

One of the apprentice classrooms

The Canadian National Apprentice System*

Five-Year courses and semi-annual examinations are features of apprentice training on the Central region

By M. A. Humber

Supervisor of Apprentices, Central Region, Canadian National

THE apprenticeship system on the Canadian National (Central Region) commenced in small way 26 years ago with night classes in one of the main shops and has grown until it now includes instruction by competent instructors during working hours at every shop, roundhouse, and car outstation where apprentices are employed. The officers of the company are entirely in charge of all work pertaining to the apprenticeship system. All text books, with revisions, are compiled by the supervisor of apprentices and his staff and these, with all material and equipment used in the class room (with the exception of drawing instruments) are supplied by the company free of charge.

The object of the apprenticeship system is to develop carefully selected young men for the purpose of supplying leading workmen for future needs, with the expectation that those capable of advancement will reveal their ability and take places in the organization for which they are qualified. The number of apprentices employed is governed by the need of the company for new men to replace those who reach the age of retirement, those who leave the service and to take care of any enlargement of shop forces that may be necessary from time to time.

The training of the apprentices embodies two distinct phases—the shop training and school training. The shop training follows a definite shop schedule. The tour of duty of the apprentice in the various departments covers a variey of work which will give the apprentice an all-around knowledge of shop practice, will develop in him the necessary skill in operating the standard machines and make him proficient in bench and erecting work. Certain machines are set aside to be operated at all times by apprentices. The school training plays a very important part in the success of all apprentices and covers mathematics, practical geometry, projection and

* A paper presented at a meeting of the Central Railway Club held at the Hotel Statler, Buffalo, New York, Thursday, March 13, 1930.

intersection work, mechanical drawing, sketching, model work, tracing and blueprint reading.

All applicants for apprenticeship are examined by an apprentice examiner in arithmetic, grammar, spelling, 75 per cent in each subject being considered as a passing mark. The first six months of apprenticeship are considered as a probationary period, during which time the work of the apprentice is watched by the foreman and shop and class instructor with a view to ascertaining whether or not the boy is adapted to the work which he has chosen. If the apprentice proves satisfactory during this period he is indentured, the indenture being pre-dated six months.

The apprenticeship term is of five years duration and is divided into ten periods of six months each. If the number of days worked by the apprentice during each period, including overtime, does not equal the shop days for that period, the apprentice must make up the number of days lost before being granted the next period rate of pay. Throughout their apprenticeship all apprentices must attend instruction classes during working hours for a period of two hours a week, receiving their regular hourly rate for the time in class. Apprenticeship is offered in the following trades: Machinist, boilermaker, blacksmith, tinsmith, pipefitter, pattern maker, moulder, electrician, welder, carman, carpenter, cabinet maker, painter, wood machinist, steamfitter and plumber, brass finisher and upholsterer.

Canadian National Apprenticeship Schedule

MACHINISTS' TRADE

Machine Shop:	
Nut facer, centering machine or screwing machine	3 months
Drill press	3 months
Slotter or milling machine	3 months
Boring mill	3 months
Shaper or planer	3 months
Bolt lathes	3 months
General lathes	6 months
Rod bench	3 months
Motion bench	3 months
Air brake	3 months
	2 years 9 months
Erecting Shop:	
Eccentric gang	2 months
Shoe and wedge and wheeling gang	3 months
Guide-bar and steam-chest gang	3 months
Frame and cylinder gang	3 months
Motion gang	4 months
Trimming gang	3 months
Front-end gang	3 months
Boiler mountings and superheater equipment	3 months
Brake and spring gang	3 months
	2 years 3 months
Total	5 years

CARMAN'S TRADE

General work on wood freight cars	6 months
General work on steel freight cars	6 months
Air brake and application to freight car	3 months
Air brake and application to passenger car	3 months
Carpenter shop	6 months
Marking-off bench	6 months
Wood (Machine shop)	6 months
General work on passenger car body building	9 months
General work on passenger car inside finishing	9 months
Cabinet shop (general work)	6 months
Total	5 years

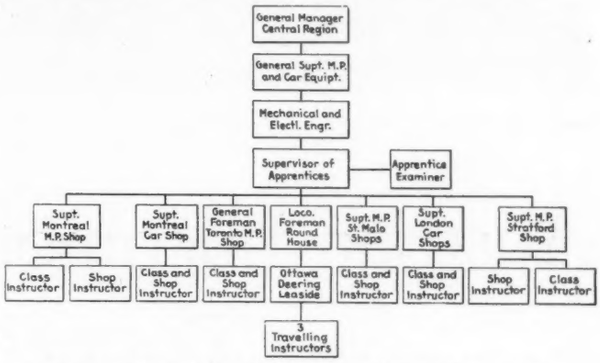
At main shops employing 50 or more apprentices, two instructors are employed, one for shop instruction and the other for classroom instruction. The shop instructor devotes all his time in routing apprentices through the shop and instructing them in their trades while the school instructor conducts three classes daily, the number in each class being governed by the total number of apprentices employed. At shops employing less than 50 apprentices, one instructor attends to the duties of both school and shop work. He conducts one class a day, the balance of his time being spent on routing and instructing the apprentices in the shops. The roundhouses and car outstations are divided into groups and each group has assigned to it a traveling instructor who visits each station in the group every week to give the necessary instruction.

Classroom Work

Classes are divided into groups according to terms or years and vary from five to eight pupils in each class. The course of five years covers geometry, mechanical drawing, sketching, blueprint reading, mathematics and theory, presented in a manner especially adapted to the needs of each particular apprentice. The first six months of his drawing course are spent largely in practical geometry, followed by projection and intersection work which extends over a period of one year. Mechanical drawing is then commenced and approximately six months is spent on simple model work and freehand sketching. Then follows the more advanced and difficult model work, including detail and assembly drawing of all description. In addition to the course in mechanical drawing there is a five-year course in sheet-metal drafting for boilermaker and tinsmith apprentices, the work studied being directly applicable to the work in the shops. All methods of development are thoroughly covered and to make the work more interesting the developments are cut out by the apprentice and put in paper model form.

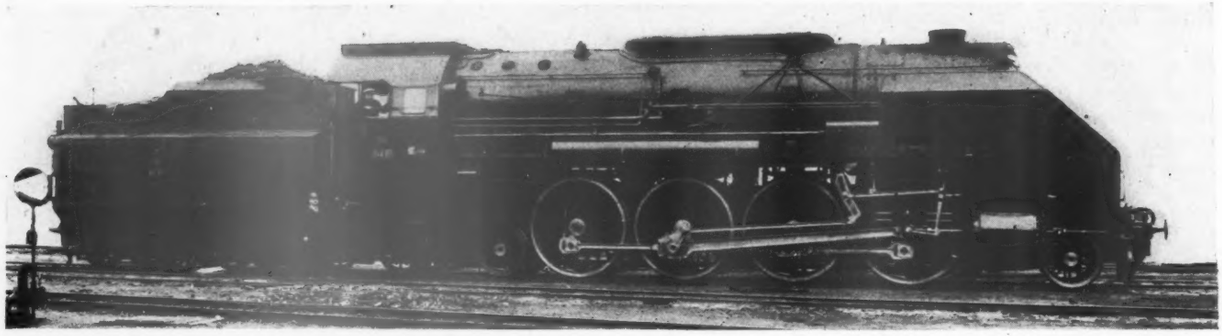
From the beginning of the course the teaching of mathematics plays an important part and, starting with the study of elementary work such as mensuration, the apprentice is gradually instructed in the more advanced forms of this subject that deal with the mechanical side

(*Concluded on page 265*)



Organization chart of the apprentice system on the Central Region

A group of Canadian National apprentices



Two-cylinder 2-8-4 type passenger locomotive built for the Austrian Western by Wiener Lokomotivfabriks, A. G.

Austrian Locomotive Equipped with Poppet Valves

Two-cylinder 2-8-4 type with tractive force of 44,100 lb. considered to meet operating requirements

By Dr. A. Giesl-Gieslingen, M. E.

THE Austrian Western Railroad forms the backbone of transportation in Austria, connecting Vienna with Germany, Switzerland and western Italy. It extends from Vienna via Salzburg and Innsbruck to the Swiss frontier, a total distance of 465 miles. Electrification of the mountain territory beyond Salzburg, traversing two mountain ranges, 3,200 and 4,200 ft. high, is nearly completed according to the extensive program established after the World War. With 12 per cent of electrified mileage, Austria ranks second in the world. During the last eight years, however, coal prices dropped radically and through the additional effect of more economical operation, the fuel bill in relation to total expenses fell from the exorbitant figure of nearly 30 per cent in 1921, to 8 per cent in 1927, and has still a downward trend. With a price of coal at the enginehouse of $4.70 per ton of 12,000 B.t.u., present relations are similar to those on American roads.

Electrification of the Vienna-Salzburg division, 196 miles long, was abandoned under these circumstances, and the purchase of modern steam power decided on.

Referring to the condensed profile of the Vienna-Salzburg line, many curves of from 4 to 5 deg. enforce speed reductions even in the easiest sections. It will be seen that locomotives of unusual characteristics are required to handle 750-ton trains over the entire division at an average of 48 m.p.h., westbound, with three intermediate stops. The axle load is limited to 40,000 lb. With few exceptions, the rails weigh 88 lb. per yd., while replacements are being made with 98-lb. rails of 82-ft. length, which will carry an axle load of 55,000 lb.

One of the illustrations shows a side elevation of a two-cylinder simple locomotive, which was built as a result of extensive studies by the Wiener Lokomotivfabriks A. G., Floridsdorf, Austria, in November, 1928. The guarantees offered by the builders included the hauling of a 700-ton train at an average of 51 m.p.h. with a speed limit of 69 m.p.h. Present regulations keep the maximum at 62.6 m.p.h. It is significant for the difficult character of the line, that this 10 per cent difference in permissible speeds affects the running time only to 1½ per cent wesbound and 2½ per cent eastbound, as only short sections are fit for such speeds. Guarantees were based upon a continuous performance of from 2,400 to 2,500 cylinder hp. between 50 and 69 m.p.h., corresponding to 1,950 and 1,650 hp. at the drawbar. While the indicated output could be easily exceeded by from 12 to 15 per cent with constant water level in the boiler, the drawbar horsepower proved to be 18 per cent more, ranging between 2,300 and 2,400 hp. at speeds of 50 and 45 m.p.h., respectively. This was due to the unexpectedly low running resistance of this locomotive. In fact, the mechanical efficiency, including air resistance and tender, figured from 86 to 91 per cent under the above conditions.

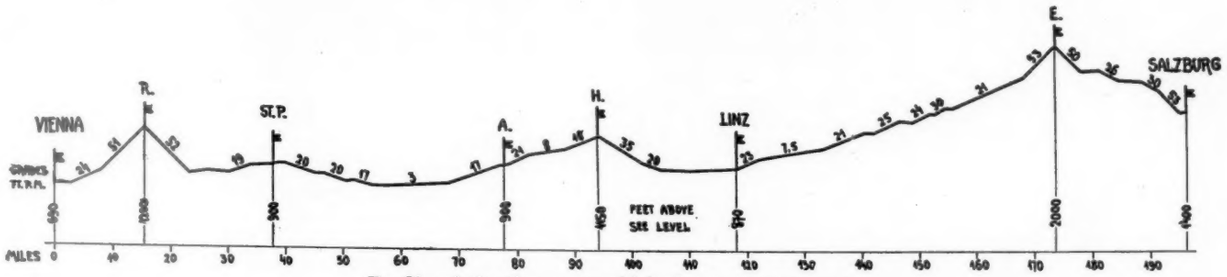
These requirements resulted in the construction of a locomotive having a rated maximum tractive force of 44,100 lb. The boiler operates at a pressure of 213 lb. and supplies steam to cylinders having a diameter of

25.6 in. and a stroke of 28.4 in. The diameter of the driving wheels is 76.4 in. The total weight of the engine is 260,200 lb. of which 155,800 lb. is carried on the drivers. The factor of adhesion is 3.54.

Designed to Secure Low Maintenance Costs

The high tractive force required for the ruling grade and also for acceleration was in no measure allowed to interfere with the running qualities at maximum speeds. The locomotive had to be suitable for 75 m.p.h., and 4½-deg. curves are often traversed at 60 m.p.h., notwithstanding operating regulations. It was necessary to reduce maintenance costs with the new design as compared with previous Austrian designs. In 1927, locomotive maintenance in Austria amounted to 140 per cent of the fuel bill, against 110 per cent in Germany and 100 per cent in the United States.

These comparisons placed the Austrian Federal Railways in a bad light and the management was anxious to show improvement. Utmost simplicity in design was desired. The four-cylinder compound with the high-pressure portion between the frames, which formerly dominated in Austria, was out of the question. A conventional boiler pressure had to be used, as the railroad was badly in need of power and no time-consuming experiments could be conducted. High superheat and scientific design of the steam engine had to render the essential fuel economy; essential not only in itself, but still more on the ground of obtaining maximum horsepower out of the limited capacity of the fireman. The varying character of the line did not yet warrant the application of a stoker, as only certain sections of the line require full power for not more than from 15 to 30 min. The engine, coupled to a standard tender, had to be turned on a 66-ft. turntable. These basic requirements led to the following solutions:

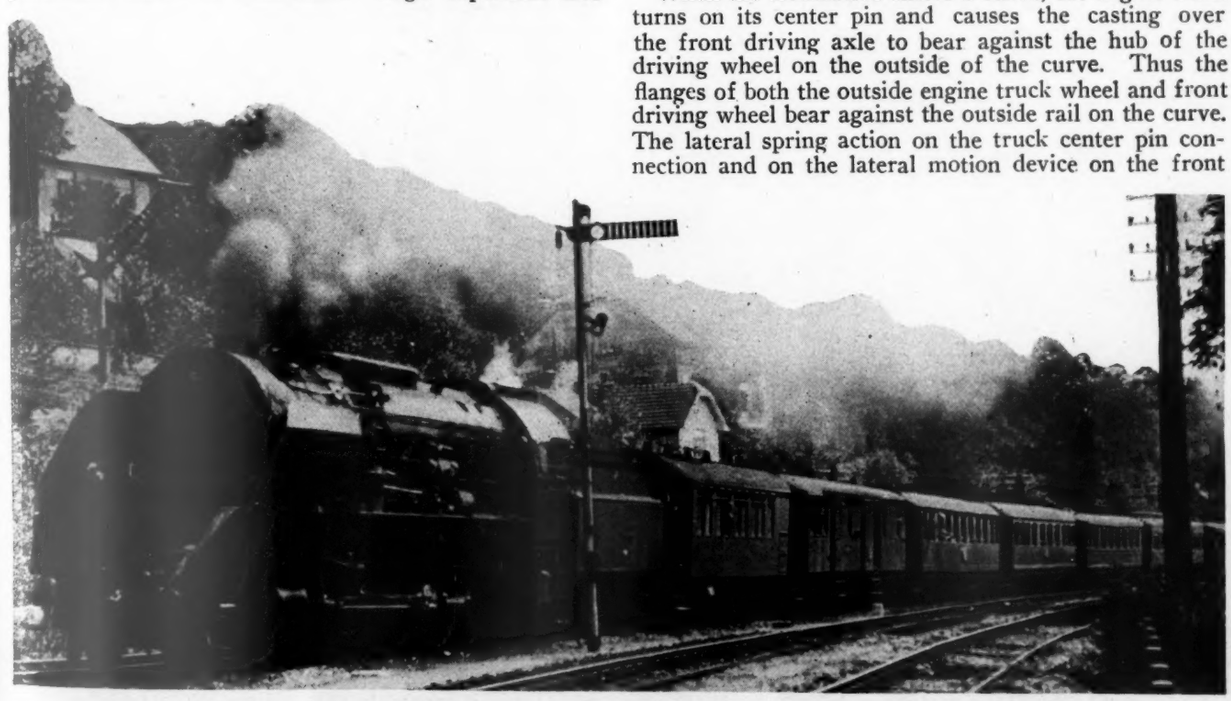


Profile of the line over which the tests were run

Engine Truck of Novel Design

The design of the engine truck is novel compared with American practice. The frame of the engine truck is somewhat similar in design to that of the two-wheel trailing truck applied to locomotives in the United States. The rear of the frame is pivoted to a casting over the front driving axle. This casting moves independently with respect to the axle and is designed to allow a lateral motion of 2¾ in. The truck center pin connection, which is located about 40 in. in rear of the front axle, is also provided with a spring-controlled lateral motion of from 2 to 2¾ in. This combination of engine truck and front driving wheels is known in Austria as the Krauss truck.

When the locomotive enters a curve, the engine truck turns on its center pin and causes the casting over the front driving axle to bear against the hub of the driving wheel on the outside of the curve. Thus the flanges of both the outside engine truck wheel and front driving wheel bear against the outside rail on the curve. The lateral spring action on the truck center pin connection and on the lateral motion device on the front

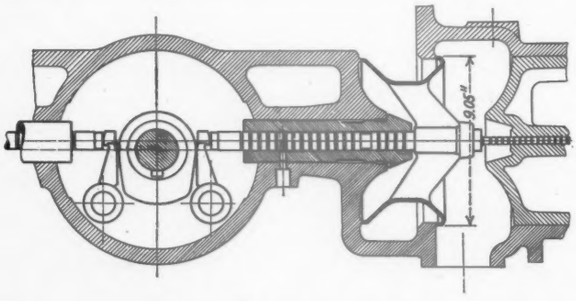


Test train with the 2-8-4 type locomotive equipped with Lentz poppet valves

drivers allow considerable flexibility when entering and leaving curves, and tends to improve the guiding qualities of the locomotive. No lateral motion is provided for the remaining three pair of drivers. The four-wheel trailing truck has a side-play of from 1⅞ in. to 2 in.

Wheel Arrangement

The inverted Pacific, or 2-6-4, type had been created in Austria for high speed service with 84-in. drivers in 1909. The excellent results secured with 99 locomotives of this type led to the adoption of the 2-8-4 arrangement as a natural development. This locomotive has the running qualities of the 4-6-4 types, which are being adopted for passenger service by a number of roads in the United States and Canada, with 33 per cent increase in tractive force and is only slightly long-



Section through the outlet valve showing the new design of cam on the Lentz poppet valve

er. Lateral motion devices on the engine truck and lead drivers permit the negotiation of 12 deg. curves.

The arrangement provides guiding qualities superior to a 4-8-2 type locomotive with its wide-swinging trailer and its generally insufficient load on the engine truck. Considering that the side thrust to be exerted by the leading wheels for the negotiation of curves ranges from 4 to 8 per cent of the engine weight, it is obvious that a truck, carrying only from 15 to 20 per cent of the locomotive weight as generally found, must necessarily leave an unpleasant percentage of this side thrust to the first pair of drivers, resulting in high rail stresses. Here, the guiding weight, as the load on the spring-controlled front wheels may be termed, is 28 per cent of the total. The centering springs can therefore be made strong enough to relieve the fixed driving wheels from excessive flange pressure. The initial tension is 6,600 lb. and rises to 15,000 lb. with maximum side play. The intention of the designers to adjust these springs so that the stops limiting the side play will never come into action, has been fully met. The locomotive is guided along the track by a smooth, predetermined spring tension and hard shocks are avoided. At especially high speeds three front and from two to three rear flanges touch the outer rail which distributes and minimizes the rail stresses.

The pleasing appearance of the locomotive is apparent in the several illustrations shown. It is the simplest and most compact design possible with four pairs of 76.4-in. drivers. The adhesive weight is 60 per cent of the total, but can be raised to 65 per cent, if the permissible axle load is increased. These are good figures for a specific high speed design and is another fea-

Principal Dimensions, Weights and Proportions of the Austrian Western 2-8-4 Type Locomotive

Railroad	Austrian Western
Builder	Wiener-Lokomotiv-fabriks—A. G.
Type of locomotive	2-8-4
Cylinders, diameter and stroke	25.6 in. by 28.4 in.
Valve gear, type	Walschaert-Lentz
Weights in working order:	
On drivers	155,800 lb.
On front truck	33,900 lb.
On trailing truck	70,500 lb.
Total engine	260,200 lb.
Total tender	123,300 lb.
Total engine and tender	383,500 lb.
Wheel bases:	
Driving	20 ft. 4½ in.
Rigid	13 ft. 7 in.
Total engine	41 ft. 6 in.
Total engine and tender	64 ft. 4 in.
Wheels, diameter outside tires:	
Driving	76.4 in.
Front truck	40.7 in.
Trailing truck	40.7 in.
Journals, diameter and length:	
Driving, main	10.63 in. by 13.4 in.
Driving, others	9.45 in. by 12.6 in.
Front truck	7.87 in. by 11.8 in.
Trailing truck	7.87 in. by 11.8 in.
Boiler:	
Type	Straight top
Steam pressure	213 lb.
Fuel, kind	Soft coal
Diameter, first ring, inside	77⅛ in.
Firebox, length and width	105 in. by 70 in.
Tubes, number and diameter	151—2¼ in.
Flues, number and diameter	38—5⅝ in.
Length over tube sheets	20 ft.
Grate area	50.8 sq. ft.
Heating surfaces:	
Firebox	203 sq. ft.
Tubes and flues	2,851 sq. ft.
Total evaporative	3,054 sq. ft.
Superheating	1,076 sq. ft.
Comb. evaporative and superheat	4,130 sq. ft.
Tender:	
Water capacity	7,160 gal.
Fuel capacity	8.82 tons
Rated tractive force, 85 per cent	44,100 lb.
Weight proportions:	
Weight on drivers ÷ total engine, per cent	59.8
Weight on drivers ÷ tractive force	3.54
Total engine weight ÷ comb. heat. surface	63.4
Boiler proportions:	
Tractive force ÷ comb. heat. surface	10.68
Tractive force × diam. drivers ÷ comb. heat. surface	814
Firebox heat. surface ÷ grate area	3.99
Superheating surface, per cent of evap. heat. surface	35.2
Combined heat. surface ÷ grate area	81.25

The main rod applied to the Austrian Western 2-8-4 type is 13 ft. 11 in. long between pin centers

ture of the 2-8-4 wheel arrangement. It should also be remarked that the deep firebox has vertical walls and a vertical throat sheet. The 2-8-4 type of freight locomotive, introduced in America a few years ago by the Lima Locomotive Works is certainly worthy of further development for high speed service along the lines as indicated above.

Frames are of Rigid Built-up Construction

Weak frames were the main reason for high locomotive maintenance in Austria. The low axle load of 32,000 lb. maintained in all previous engines and the demand for high output induced designers to use exceptionally light frames which, while admirable for the boldness of their conception, deformed and led to excessive wear of the whole driving gear, as well as additional running resistance.

To Americans, who enjoy the strength and adaptability of the Commonwealth one-piece steel bed casting, the solution here employed need be only briefly mentioned. Such large steel castings being unavailable, an

Front view of a three-cylinder locomotive equipped with wind guides similar in design to those on the new 2-8-4 type

absolutely rigid built-up construction was substituted. The two plate frames are connected by a two-piece casting of 85,000 lb. tensile strength, which extends from the front bumper to the rear coupled axle. Additional castings form the connection at the rear. This frame greatly exceeds any existing European design in strength, and contributes essentially to the success of this locomotive.

Two-Cylinder Versus the Three-Cylinder Arrangement

The builders apparently involved a risk by the adoption of the two-cylinder arrangement. In fact, the railroad contemplated a three-cylinder engine even in its original plan for a lighter 2-6-4 type. Experiences with 40 2-8-0 type passenger locomotives, Series 113, which were hitherto the heaviest Austrian two-cylinder engines, with 80,000 lb. piston thrust did not encourage the use of still heavier working parts for even higher speeds. While the locomotive works of Wiener Neustadt advocated and secured an order for a three-cylinder single-expansion engine, the Floridsdorf Works relied on the possibility of meeting all difficulties by suitable design and undertook the jump to 107,400 lb. piston thrust, or 35 per cent more than so far experienced, thereby approaching American loads, yet with only two-thirds of the axle load.

The world may never come to an agreement as to extended or non-extended piston rods. Certainly the extension is expensive nonsense unless made sufficiently stiff to carry the piston properly which, oddly enough, is often neglected. If a liberal and easily accessible rod bearing is provided it should be apparent at a glance whether the wear of this bearing is still within the limits. An outside bearing has been employed in this design which follows the elastic deformation of the rod by moving around a horizontal axis. The piston rod is 3.860 in. in diameter throughout, hollow bored to a thickness of only 0.350 in. for the extension and 0.850 in. between the piston and crosshead.

Main Rod Measures 13 ft. 11 in. Between Centers

The main rod is shown in one of the illustrations. It measures 13 ft. 11 in. between centers, and is believed to be the longest in the world. This extreme length was considered desirable in order to reduce rail stresses under the action of the vertical component of the piston thrust. Many existing locomotives are defective in this respect. The expense involved in manufacturing these long rods of extremely light section is nothing compared with the damage done by incorrect designs. In this engine, the main rod weighs only 850 lb. without brasses.

Unavoidable irregularities have to be dealt with by special measures. An important point to be considered in the design was the back end of these rods. It appears that an unequal bearing pressure over the axial length of the pin is the main cause of hot cranks and excessive wear. Therefore, the brass bearing was made free to adjust itself around a vertical axis, so that the connection between the pin and the rod is similar in many respects to a universal joint. Perfect bearing contact is secured over the entire 7.1-in. by 8.7-in. pin. After 13,000 miles of express-passenger service, the wear of the babbit bearing was less than .020 in. on the diameter. Oil lubrication has always kept it cool. In striking contrast to this extraordinary result are the records of the previously mentioned 2-8-0 type locomotives, the keys of which had to be driven in after every 1,000 miles of service.

Similar contrasts have been achieved in the life of the side-rod bearings which, when properly adjusted, run 20,000 miles with .020 in. of wear. The main-connection bearing usually requires adjustment after half this distance. The play allowed between the axle boxes and pedestals was .020 in. The front and rear coupling pins are spherical and so are the crosshead pins. The back end of the main rod can be taken from the crank pin and swung sideways for inspection without touching the crosshead end. The handling of spherical bearings, however, requires some experience which the Austrian Federal Railways have been acquiring for the past 20 years.

Lentz Poppet Valves are Actuated with a Walschaert Motion

Credit must be given to the Austrian Federal Railways for its vision in developing the poppet vale gear for locomotives. It was real pioneer work. Although locomotives were equipped with poppet valves in Ger-

many about 17 years ago, or nine years before the first Austrian installation, many difficulties had to be overcome. The Lentz gear is the result of a long development in which the Floridsdorf Locomotive Works took a leading part. Ruggedness and simplicity appear to be the main differences when compared with other or earlier designs, and these are fundamental requirements in railroad service. The small cams which acted on rollers and levers, and which have always been associated with the poppet valve gear, have been eliminated. A conventional, but light Walschaert gear moves a swinging cam shaft. A cam, 4 in. in width, turns directly on the flat surface of an intermediate lever. By a happy design of these two parts a relative rolling movement practically without sliding is secured between the cam and the lever during the acceleration period of the valve, when considerable force is required. Sliding occurs largely during retardation under small contact pressure. Wear is negligible and is limited to the brass cam which can be easily replaced. The gear requires no attention for 100,000 locomotive miles and more. This, from the viewpoint of the railroad, is the principal objective and means not only a direct saving as compared with other means of steam distribution, but secures a better average condition of the valve gear and considerable steam economy.

When drifting, the inlet valves are automatically lifted from their seats and connect the cylinder front and back of the piston through ample areas. Thus, sucking in of cinders is avoided and there is no compression when running light. With only 60 tons behind the tender, the engine drifted down a curved grade, shown on the profile drawing, of 35 ft. to the mile at 50 m.p.h. between mileposts 94 and 100.

The Austrian Railways have now over 400 locomotives with poppet valves, five of which are of the Caprotti type. They have definitely abandoned the piston valve. Inlet and exhaust opening in this engine occurs twice as rapidly as in the German standard Pacific type with 12-in. piston valves. The sound of the exhaust is sharply defined. At 70 m.p.h. the quick release makes the exhaust sound like that of an internal combustion motor.

Special Equipment

Accessories are standard and need not especially be referred to. It might be mentioned that a Sunbeam turbo generator is installed. The lubricating system has been carefully designed, 42 bearing points being served by mechanical pumps, including all axle boxes, truck bolsters, etc. No grease is used on the working parts. The feedwater heater is of the Dabeg open type with a mechanically driven pump. The smokebox has a downward extension to secure a low position for the exhaust nozzle and a sufficiently wide stack. With a plain nozzle of 6.3 in. diameter the draft is somewhat too strong. Wind guides have been applied at the front of the locomotives, creating a current of air along the boiler which prevents the exhaust from trailing down into the cab.

Service Results

The railroad made extensive tests on the upward run from Vienna to Linz, 118 miles, early in the summer of 1929, after the locomotive had been in regular service for several months. No repairs were made or work performed to place the locomotive in first-class condition. The valves and piston rings remained untouched. The coal consumption was nearly constant with trains from 400 to 740 tons, averaging 3.06 lb. of coal of 11,700 B.t.u., or 2.96 lb. of dry coal per drawbar horsepower-hour, including all auxiliaries and losses from terminal to terminal (or 2.66 lb. of dry coal of 13,000 B.t.u.) The average speed was 48 m.p.h. and the maximum 66 m.p.h. One stop and about five speed reductions were made, one of these being a reduction to 20 m.p.h. on a one-per-cent grade, where track repairs were being made during the entire test period.

The thermal efficiency averaged 7.01 per cent including all losses. The combustion rate was from 50 to 80 lb. per sq. ft. of grate, as an average, with a maximum of 120 pounds, for periods not exceeding 15 min. These results cut by three per cent the guarantees for fuel consumption given by the builders for this service. Judging from this performance, one drawbar horsepower-hour in sustained service will be delivered for 2.2 lb. of dry coal of 13,000 B.t.u., excluding auxiliaries, at 40 m.p.h. and the maximum service rating of 2,100 drawbar horsepower will correspond to a combustion rate of about 100 lb. At 60 m.p.h. the consumption rate will rise to 2.3 lb. The cut-offs required are 38 per cent and 30 per cent respectively.

The valve gear permits of service cut-offs as short as 2½ in., or nine per cent of the stroke, aud even less, whereby the compression reaches two-thirds of the boiler pressure. These cut-offs are smaller than required and experience indicates that a minimum of from 15 to 20 per cent should be used with any kind of valve gear with regard to overall economy and a view of limiting friction and wear.

The records of this locomotive, which averages 9,000 miles a month in a comparatively short-haul service, are a clear indication that much can be achieved by careful design with entirely simple and, in principle, conventional means. The next step should be towards higher pressures.

Great Northern Buys 4-8-4 Type Locomotives

(*Continued from page 250*)

outside journal-box pedestals cast integral. The two side frames are connected with each other, front and rear, so as to enclose the wheels. The front and back portions of the truck casting are braced at the center by means of a diaphragm connected to the truck bolster. The design is of the constant-resistance equalized type, the rockers setting in cavities cast in the top of the truck bolster.

The tender frame is of Commonwealth cast-steel water-bottom construction and the seams of the Vanderbilt type body are welded throughout. The tender is carried on two six-wheel cast-steel trucks. It has a capacity for 17,000 gal. of water and 5,800 gal. of oil. In case the locomotive should be converted from an oil to a coal-burner, the tender can be remodeled to carry 24 tons of coal.

IT TAKES a lot of "elbow grease" to blow the whistle on a locomotive on one trip between McComb, Miss., and New Orleans, La., 105 miles, according to J. H. Morgan, of McComb, engineman of the Illinois Central. "To make the whistle blast effective, the engineer must produce a 10-lb. pull on the cord, and in the 376 times that the whistle should be blown on my run one way, there is a total of 3,760 lb. of cord pulling," he writes. Mr. Morgan has been running a locomotive since 1900, and in that time his iron horse has never injured anyone.

Examples of Recent Three-Cylinder Locomotives of Various Types

General Dimensions, Weights and Proportions

Type	0-8-0	0-8-0	0-8-0	2-8-2	2-8-2	2-8-2	4-6-2	4-6-2	4-6-2	4-8-2	4-8-2	4-8-2	4-8-2	4-8-2	4-10-2	4-10-2	4-10-2	4-12-2
Railroad	I.H.B.	Belt Ry.Ch.	N.Y.N. H.&H.	L.&N.	M.P.	Wab.	C.R. I.&P.	L.&N.	M.P.	D.L. &W.	D.L. &W.	D.&R. G.W.	L.V.	N.Y.N. H.&H.	Bald.	S.P.	U.P.	U.P.
Builder	Amer.	Bald.	Amer.	Amer.	Amer.	Amer.	Amer.	Amer.	Amer.	Amer.	Amer.	Bald.	Amer.	Amer.	Bald.	Amer.	Amer.	Amer.
Road class	0—4a	.....	T-4a	.....	.....	K-5	P-46	.....	.....	.....	.....	M-75	.....	R-3a	Note 1	SP-1	.....	.....
Road number	102	150	3,605	1,999	1,699	2,604	999	295	6,000	1,454	2,230	1,606	5,000	3,556	60,000	5,043	8,000	9,016
Date built	1927	1925	1927	1924	1925	1925	1924	1925	1925	1925	1927	1926	1924	1927	1926	1927	1925	1928
Tractive force, engine, lb.	75,700	66,300	60,600	65,700	65,700	64,600	46,450	47,000	47,000	61,100	77,600	75,000	64,700	71,500	82,500	83,500	78,000	96,650
Tractive force, booster or aux. loco., lb.	13,800	.....	.....	.....	.....	.....	.....	.....	.....	.....	10,220	.....	.....	.....	.....	12,200	.....	.....
Cylinder horsepower (Cole)	2,985	2,856	2,613	2,856	2,856	2,856	2,596	2,596	2,596	3,378	3,378	3,448	3,378	3,462	.....	3,798	3,448	4,329
Piston speed at 10 m.p.h., ft. (outside)	314.5	275.1	275.1	284.5	284.5	280.0	211.9	214.8	214.8	214.8	284.5	250.8	227.2	243.5	282.2	282.2	266.7	267.5
Engine and Tender Data																		
Weight of engine, lb.	294,000	258,150	245,000	334,000	340,000	342,000	301,000	295,000	311,000	382,000	397,500	419,310	369,000	379,000	457,500	445,000	405,000	496,500
Weight on drivers, lb.	294,000	258,150	245,000	245,500	244,500	252,000	187,000	177,000	191,000	256,000	276,500	290,530	246,500	260,000	338,400	317,500	288,500	354,000
Weight on front truck, lb.	.....	.....	.....	27,000	34,500	32,500	55,000	60,000	61,000	66,500	59,000	67,880	66,000	58,500	57,500	66,500	60,000	81,000
Weight on trailing truck, lb.	.....	.....	.....	61,500	61,000	57,500	59,000	58,000	59,000	59,500	62,000	60,900	56,500	60,500	60,600	61,000	56,500	61,500
Weight of tender, loaded, lb.	221,300	159,450	286,500	187,000	190,100	194,500	196,000	195,000	234,000	218,200	215,500	297,090	201,000	288,500	243,400	291,000	242,500	310,500
Tender, water capacity, gal.	12,000	7,700	16,000	10,000	10,000	10,000	10,900	10,000	12,000	12,000	12,000	15,000	10,500	16,000	12,000	16,000	12,000	18,000
Tender, fuel capacity, tons or gal.	15	14½	18	16	16	18	16	16	16	14	14	25	15	18	16	4,912	20	22
Wheel base, driving, ft. and in.	16—4	16—0	16—4	17—10	17—10	17—10	13—6	14—4	14—4	19—0	17—6	18—3	18—0	19—9	22—10	22—10	22—6	30—8
Wheel base, engine, ft. and in.	16—4	16—0	16—4	37—5	37—5	39—1	36—7	36—7	36—7	41—8	39—11	41—6	41—2	42—3	45—2	45—3	44—1	52—4
Wheel base, engine and tender, ft. and in.	56—9¾	53—1½	64—1	73—1½	72—3½	73—9½	74—6	71—5½	76—2	77—10	75—9½	86—5	77—8	85—4	86—11¼	88—4¼	82—5	91—6½
Cylinders, diameter and stroke, outside, in.	23½x32	23x28	22x28	23x32	23x32	23x32	22½x28	22½x28	22½x28	25x28	25x32	25x30	25x28	22x30	27x32	25x32	25x30	27x32
Cylinders, diameter and stroke, inside, in.	23½x28	23x28	22x28	23x28	23x28	23x28	22½x28	22½x28	22½x28	25x28	25x28	25x30	25x28	22x30	27x32	25x28	25x28	27x31
Driving wheels, diameter, in.	57	57	57	63	63	64	74	73	73	73	63	67	69	69	63½	63½	63	67
Boiler Data																		
Steam pressure, lb.	200	200	200	200	200	200	190	190	190	200	200	210	200	265	350	225	210	220
Fuel	Soft coal	Soft coal	Soft coal	Soft coal	Coal	Soft coal	Soft coal	Soft coal	Coal	Soft coal	Soft coal	Soft coal	Soft coal	Soft coal	Soft coal	Oil	S-B coal	S-B coal
Boiler, diameter, first ring, in.	86	80	76	84½	88	88	74⅝	74⅝	76⅝	84¾	90 1/16	9	82½	79⅝	84	88 1/16	86¼	90
Firebox, length, in.	102⅛	114 1/16	96	120⅛	114⅛	120⅛	114⅛	114⅛	114	120⅛	120⅛	126⅛	126⅛	120	199½	126⅛	126	184½
Firebox, width, in.	102¼	72¼	84¼	84¼	84¼	84¼	84¼	84¼	84¼	96	96	108	96¼	85	96	102¼	96	108¼
Tubes, number and diameter, in.	315—2	212—2	229—2	247—2¼	199—2¼	239—2¼	185—2¼	185—2¼	199—2	285—2	285—2	244—2¼	230—2¼	29—2¼	202—2¼	261—2¼	250—2¼	40—3½
Flues, number and diameter, in.	50—5½	36—5½	38—5½	45—5½	45—5½	45—5½	40—5½	40—5½	40—5⅜	50—5⅜	50—5⅜	64—5½	50—5½	184—3½	50—5½	50—5½	50—5½	222—3½
Length over tube sheets, ft. and in.	16—0	14—11	16—0	19—0	19—0	19—0	19—0	19—0	21—0	21—0	21—0	19—6	21—0	19—8	23—0	23—6	23—6	22—0
Grate area, sq. ft.	72.5	57.2	56.1	70.3	66.8	70.3	66.8	66.8	66.7	80	80	95	84.3	70.8	82.5	89.6	84	108¼
Heating surface, firebox, total sq. ft.	248	277	253	326	349	340	378	285	272	393	420	512	392	451	772	390	390	591
Heating surface, tubes and flues, sq. ft.	3,769	2,425	2,779	3,978	3,437	3,884	3,149	3,150	3,352	4,589	4,590	4,581	4,337	3,634	4,420	5,286	5,132	5,262
Heating surface, total evap., sq. ft.	4,017	2,702	3,032	4,304	3,786	4,224	3,527	3,435	3,624	4,982	5,010	5,093	4,729	4,085	5,192	5,676	5,522	5,853
Superheating surface, sq. ft.	953	630	740	1,050	1,051	1,079	933	933	1,019	1,290	1,292	1,495	1,294	1,745	1,357	1,500	1,505	2,560
Comb. evap. and super. surface, sq. ft.	4,970	3,332	3,772	5,354	4,837	5,303	4,460	4,368	4,643	6,272	6,302	6,588	6,023	5,830	6,549	7,176	7,027	8,413
Proportions and Ratios																		
Weight on drivers ÷ weight of engine, per cent	100	100	100	73.6	72.0	73.7	62.1	60.0	61.4	67.0	69.5	69.4	66.8	68.5	74.0	71.3	71.2	71.4
Weight on drivers ÷ tractive force	3.88	3.90	4.04	3.73	3.72	3.90	4.03	3.77	4.06	4.18	3.56	3.88	3.81	3.66	4.10	3.80	3.70	3.66
Weight of engine ÷ comb. h. s.	59.1	77.5	65.0	62.3	70.2	64.5	67.5	67.5	67.0	60.9	63.0	63.7	61.2	65.0	69.8	62.0	57.7	59.0
Firebox surface per cent evap. h. s.	6.17	10.25	9.12	7.58	9.22	8.05	10.71	8.30	7.50	7.90	8.38	10.05	8.27	11.05	14.88	6.87	7.06	10.10
Firebox surface ÷ grate area	3.42	4.85	4.51	4.63	5.22	4.83	5.66	4.27	4.08	4.92	5.25	5.39	4.65	6.37	9.37	4.35	4.65	5.45
Superheat. surface per cent comb. h. s.	19.2	19.0	19.6	19.6	21.7	20.3	20.9	21.4	22.0	20.6	20.5	22.7	21.5	29.9	22.2	20.9	21.4	30.5
Tractive force ÷ comb. h. s.	15.2	19.9	16.05	12.27	13.6	12.2	10.4	10.75	10.13	9.75	12.3	11.4	10.75	12.2	12.6	11.6	11.1	11.5
Tractive force × dia. drivers ÷ comb. h. s.	869	1,034	915	773	857	780	770	785	740	712	775	763	742	840	800	738	700	770
Comb. heat. surface ÷ grate area	68.6	58.3	67.2	76.2	72.4	75.4	66.8	65.4	69.6	78.4	78.8	70.4	71.4	82.4	79.4	80.1	83.7	77.7
Notes	a-e-g	b-d	a-d	a	a-d	a	a-d	a	a-d	2	a-d-g	b-c-d-e	3	a-e-k	b-e	a-f-g	a	a-f

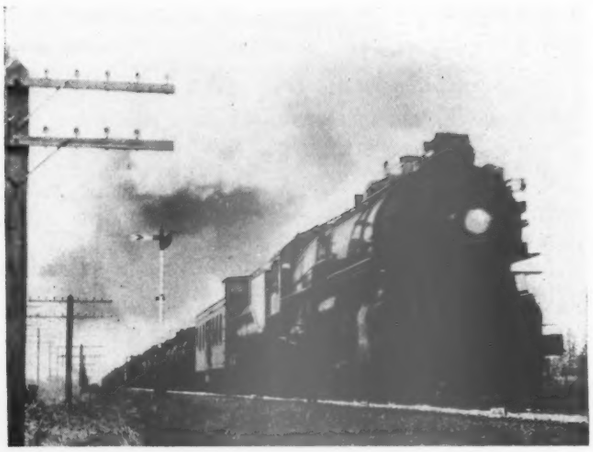
Key to notes: a—Boiler diam., inside; b —Boiler diam., outside; c—Combustion chamber; d—Syphon; e—Feedwater heater; f—Limited cut-off; g—Booster or aux. loco.; k—Type E superheater.
Note 1—Compound, high press. cylinder inside, low press. cylinders outside. Water-tube firebox.

Air Brakes Play Important Part in Transportation*

Increased weights and speeds together with variety of equipment have created complicated braking problems

By S. G. Down

Vice-President, Westinghouse Air Brake Company, Wilmerding, Pa.



A.R.A. brake-test train in operation on the Southern Pacific

THERE is no other appliance used in the art of transportation that is subject to more variables than the air brake. There is the great variation in the light weight of cars; variation in capacity of cars, the association of empty and loaded cars in the same train; the handling of long empty trains in level service and heavy tonnage trains in grade service; high speeds of passenger and merchandise trains as compared with low speeds of tonnage trains; the grouping of empty and loaded cars in different sections of the trains; extreme variations in temperature as occasioned by cars going in a few days from the frozen north to the heat of the south; and variation in operation and maintenance of the equipment occasioned by individual views and skill of men scattered throughout the length and breadth of this land.

Braking Ratio

The power of the device utilized in the control of vehicles must of necessity bear a direct relation to the size of the vehicle and its speed, together with certain local or special conditions under which it will operate.

Steam railway passenger-train cars for service operation are braked at a ratio of 90 per cent of the light weight; for emergency operation, 150 per cent. The standard freight car for service operation is braked at a ratio of 60 per cent of its light weight; for emergency operation 65 per cent. Electrically propelled cars in rapid transit service are normally braked at 100 per cent of the light weight and for emergency 140 per cent. Street cars arranged for single-unit operation are braked at ratios varying from 100 per cent to 120 per cent.

The clasp form of brake is most desirable for heavy cars as it permits the heavy brake work to be distributed over two shoes per wheel, thereby keeping the shoe temperature at a low degree with resultant higher coefficient of friction. It also eliminates longitudinal thrust on the journal bearings and the tendency to force the journal brass out of its normal position.

During the past 60 years' development of the air brake, practically no change has been made in the basic braking ratios mentioned, because they are more or less fixed by adhesion limits and, therefore, not subject to the varyng problems confronting the pneumatic apparatus which necessarily has passed through several major changes.

The Major Problem—Control of Air Volumes

The outstanding problem that has confronted the air-brake engineer is producing air-brake devices with which the flow of air through the brake pipe, extending throughout the length of the train, may be sufficiently rapid. It is on the brake pipe that we depend for operating the air brake on each car, and as there is a relationship between the rise and fall of pressure in the brake pipe to the application and release of air from the brake cylinder, it follows that different rates of rise and fall of pressure at the two ends of the train interfere with the uniformity of brake operation, with resultant train slack movement and occasional shocks.

It was the slow flow of air through the train pipe that resulted in the original straight air brake of 1869 being displaced by the plain automatic brake of 1872. This equipment involved the use of a valve device, known as the triple valve, and an auxiliary reservoir added to each car. The plain automatic brake equipment performed satisfactorily until train lengths reached about 35 cars when it failed to respond quick enough on the rear end during emergency applications due to insufficient velocity of brake-pipe air flow.

As a result the quick-action brake was developed in

* Abstract of paper presented at a joint meeting of the New York Railroad Club, the Manhattan Air Brake Club and the American Society of Mechanical Engineers in New York, January 17, 1930.

1887. This brake functioned adequately until train lengths had considerably exceeded 50 cars, when the need for some means to produce local brake-pipe reductions during service applications became evident. This was accomplished by the so-called quick-service feature introduced during 1905 in what is now known as the Type K triple valve. This valve is now standard on all freight cars in North America. For the past twenty odd years it has been performing in a most satisfactory manner. However, as train lengths have now been greatly extended in many cases, the American Railway Association is giving consideration to further improvements in the equipment for 100-car trains and is conducting a most elaborate series of tests on the Southern Pacific Lines to determine what further improvements, if any, should be made in the brake equipment to increase still further the efficiency of present-day train operation. These tests have not yet progressed to the point of reaching a conclusion, but when they are finished a most comprehensive record will be available and presumably will be submitted in a complete report

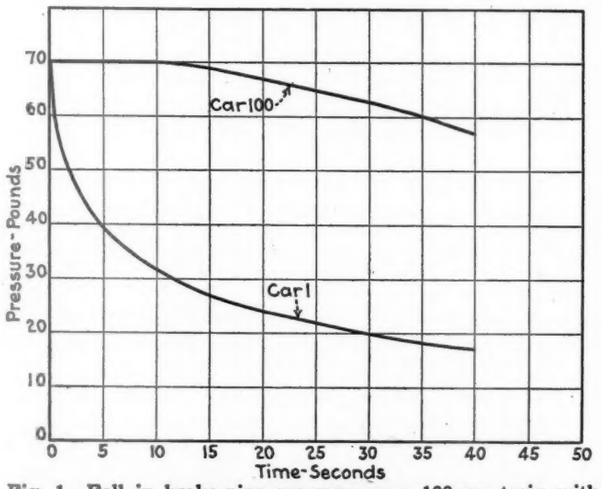


Fig. 1—Fall in brake-pipe pressure on a 100-car train with the triple valves cut out and the engineman's brake valve in emergency position

by H. A. Johnson, Director of Research, American Railway Association, who is in charge of these tests.

Influence of Train Length and Volume on Movement of Air

The air-brake engineer, like the transportation engineer, is constantly on the alert for means to eliminate time so as to offset the increase in stopping distance incident to the increase in speed and weight of vehicles. The time factor applies both to the relative operation of the valves on the head and rear end of long trains, whereby more nearly simultaneous action may be obtained, and to the build up of brake cylinder pressure to its maximum.

Fig. 1 illustrates the change in brake-pipe pressure on a 100-car train having no local venting feature, the equipment being cut out and the engineman's brake valve placed in emergency position. It will be observed that the pressure on Car 1 was reduced 40 lb. before any reduction was obtained on Car 100, and 12 sec. elapsed from the movement of the brake-valve handle before any reduction was started on Car 100.

Fig. 2 illustrates the change in brake-pipe pressure with the brake valve placed in emergency position and using the local emergency venting features of the triple valve. It will be observed that the pressure on Car 100 was beginning to fall when the pressure on Car 1 had been reduced 35 lb., and the reduction on Car 100 began 7 sec. after the movement of the brake valve to emergency position.

Fig. 3 compares the rate of propagation of a brake-pipe reduction throughout a 100-car train 4,000 ft. long with quick-service and non-quick-service triple valves. This chart emphasizes the necessity of venting brake-pipe air locally to reduce brake-pipe pressure throughout the train with sufficient rapidity and uniformity. It also illustrates that this cannot be accomplished by discharging all the air at the engineman's brake valve on the locomotive.

A similar differential in pressure on opposite ends of the train is present during the release operation of the brake. Fig. 4 illustrates the effect following the movement of the brake-valve handle to release position with 50 lb. in the brake pipe. It will be observed that the pressure on Car 1 was raised to above 70 lb. before any increase was had on Car 100, and 3½ min. elapsed before the pressure on Car 100 had raised 10 lb. It is understood that release of the brakes is not delayed to this extent, as triple valves normally move to release position when the brake pipe pressure has been raised 2 or 3 lb. above the auxiliary-reservoir pressure. The chart illustrates the time involved in restoring pressure at the rear of long trains after brake application.

Electric Control of Air Brakes on Freight Cars

Among the various types of brakes tested during the 50-car brake trials on the Chicago, Burlington & Quincy in 1886 was one having electrically controlled valves. However, due to electrical difficulties and the satisfactory results obtained with the quick-action features which were then placed in the triple valve, the pneumatic action was sufficiently satisfactory as to eliminate electric control.

The question of controlling brakes on freight trains electrically has been reviewed many times during the past forty odd years and has not been considered favorably due to the improvements made in the pneumatic equipment whereby the time of application has been reduced. With the electrical problems that would have to be met, and the fact that electric control could not be obtained until all of the cars now in interchange

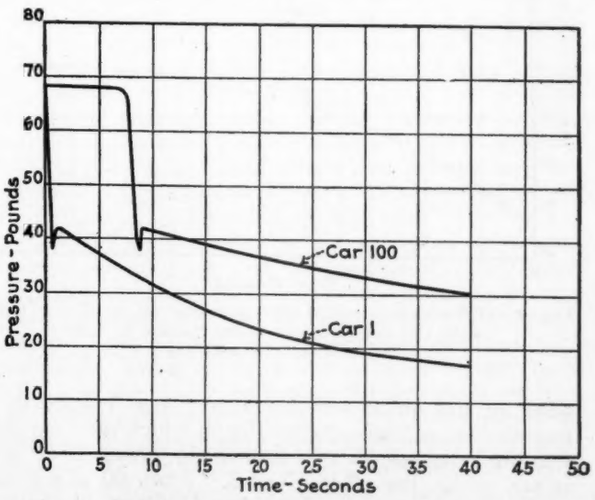


Fig. 2—Fall in brake pipe pressure on a 100-car train with emergency application, using the local venting features of the K-2 triple valve

were thus equipped, which number about 2½ million, it is not considered a practical brake.

The Passenger Car Brake—Universal Valve

Passenger- and express-train service is now adequately served by a modern brake device known as the Universal valve. This valve possesses improved features such as quick service, quick action, graduated application, graduated release, high and quick building-up of cylinder pressure during emergency applications and a protection feature that insures an automatic emergency

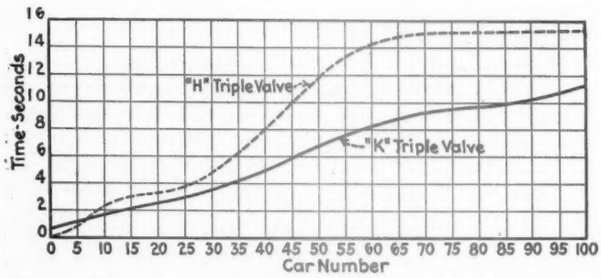


Fig. 3—Rate of propagation of service brake-pipe reduction on 100-car trains equipped with H and K type triple valves

application of the brake if the brake-pipe pressure falls to a predetermined point.

Fig. 5 compares the development of brake cylinder pressure on two 12-car trains, one with quick service, the other without. On the non-quick-service train, at the end of 9¾ sec., there is 14-lb. brake-cylinder pressure on Car 1, and on Car 12 the pressure is but 3 lb. In contrast with this, the quick-service train shows no substantial difference in brake-cylinder pressure at any time between the front and rear end. Slack action from inequalities of brake-cylinder pressure at any given time is, therefore, eliminated so far as chargeable to the action of the air-brake devices.

The more prompt and uniform application made pos-

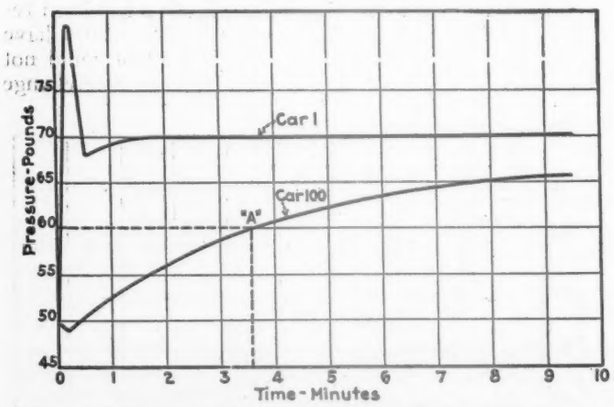


Fig. 4—Difference in brake-pipe pressure on a 100-car train with the engineman's valve handle in full release for 20 seconds

sible by the quick service feature also results in a shorter stop as illustrated by Fig. 6, which shows speed-stop-time curves for two trains, one having U-12 universal valves, the other U-12-B. From 60 m.p.h. the non-quick-service train stopped in 41¼ sec.; the quick-service train stopped in 38¼ sec. There is a gain of approximately 7 per cent in time and stopping distance. From 30 m.p.h. the comparative stopping times were 23 and 20¾ sec., a gain of approximately 10 per cent in time and stopping distance.

Pneumatic vs. Electro-Pneumatic Brakes

Prior to the introduction of the quick-service feature in the universal valve, provision was made whereby the valve could be actuated electrically and a train so equipped operated for a period between New York and Washington, D. C., on the Pennsylvania. Smooth and satisfactory service was obtained. However, with the development and introduction of the quick-service feature in this valve, the difference in action between pneumatic and electric operation on the test train of 12 cars was so slight that, for steam-railway service, the pneumatic operation was considered adequate.

Fig. 7, shows the comparative build-up of brake-cylinder pressure on a 12-car multiple-unit train having UEA-12-BC equipment, first, when operating as a purely pneumatic brake, and, second, as an electro-pneumatic. It will be noted that with the electro-pneumatic operation, the brakes on the first and twelfth cars started to apply at the same time, one second after movement of the brake-valve handle, and the pressures continued to develop at the same rate. On the train having the pneumatic equipment, the brakes on Car 1 began to apply two seconds after the electro-pneumatic train, and Car 12 began to apply one second later.

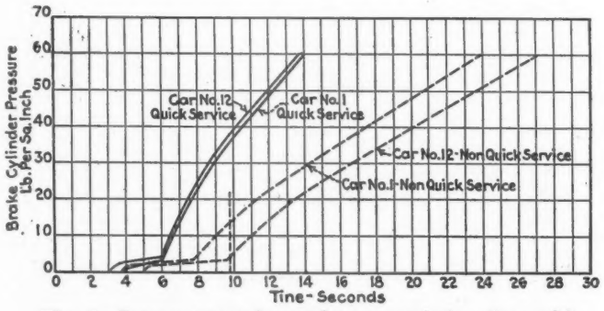


Fig. 5—Improvement in service transmission time with UC passenger-car equipment

From then on the build-up of pressure on Car 12 lagged about ¾ sec. behind Car 1.

Empty-and-Load Brake for Freight Cars

Freight cars through improvements in design and the use of stronger materials are developing a great variation between the light and loaded weight. Today cars are contemplated of 60,000 lb. weight with a capacity of 90 tons, providing a gross to tare ratio of 4 to 1. It will be observed that with a braking ratio of 60 per cent of the light weight the 90-ton car when loaded will only have 15 per cent braking ratio.

The effect of this low braking ratio is most detrimental when such cars are associated in trains with cars having higher braking ratios, because of difficulty of slack control, and in heavy grade service special measures have to be taken so that this reduced braking ratio will be sufficient to overcome acceleration due to grade. To meet this situation, a form of brake known as the empty-and-load was developed which involves the use of two brake cylinders, one of which is used when the car is empty and both when under load. Changing from empty to load position is accomplished through a manually operated lever on each side of the car. The change over mechanism is manually operated to load position and automatically to empty. The auto-

matic control from load to empty position is actuated by a reduction of pressure in the auxiliary reservoir to a predetermined amount as, when a car is set out on a siding to be unloaded and the reservoir pressure is reduced, the mechanism automatically changes over to empty position.

An extreme variation in gross to tare ratio on freight cars is found on the modern coal cars of the Virginian. These cars weigh 75,000 lb. and have a capacity of 120

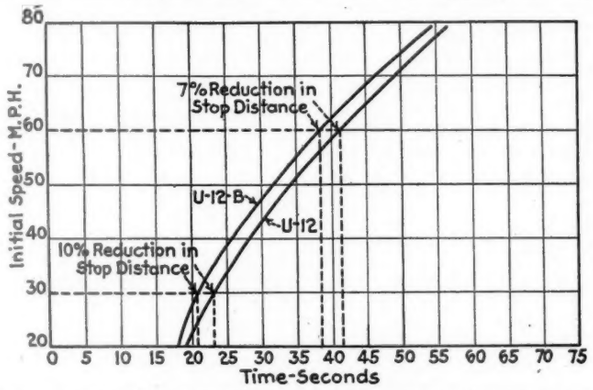


Fig. 6—Stopping times for passenger trains having U-12 Universal-valve equipment from various initial speeds —Comparison of quick service and non-quick service on a 12-car train

tons and, in view of the extreme capacity of these cars, they are equipped with a special form of empty-and-load brake which involves the use of three brake cylinders. The braking ratio is 40 per cent empty and loaded.

Discussion

T. L. Burton, air brake engineer, New York Central and secretary of the Air Brake Association, in discussing Mr. Down's paper spoke of the need for improving the foundation brake gear. The inefficiency of the foundation brake rigging, he said, was especially noticeable in suburban service. There was considerable loss, in time during the first application in making station stops, and the problem of hastening this application was one requiring solution. One of the elements involved was the time required to get the brake shoe against the wheel. Mr. Burton also paid tribute to the work of the Air Brake Association and that of the Committee on Air Brakes of the A. R. A. He said that the work of this

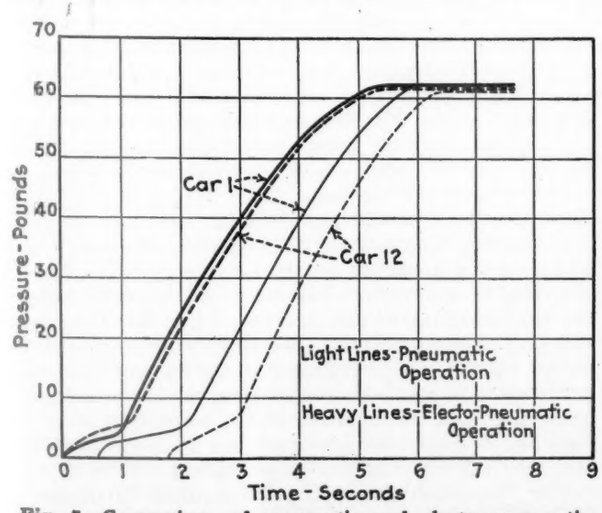


Fig. 7—Comparison of pneumatic and electro-pneumatic brake operations with the Universal valve

committee was frequently misunderstood because it frequently had to serve in arbitration cases. The large amount of work falling to this committee makes it a difficult matter to attend to all detail recommendations as promptly as it would like.

L. K. Sillcox, vice president, New York Air Brake Company, stressed the value of the human element in securing satisfactory brake operation. Some roads, he said, get better results from the same brake than do others and the only reason for such a condition is the success on the part of certain roads to solve the human problems involved and the inability of other roads to arrive at a satisfactory solution. He also discussed the question of complications in the design of air brakes and the possible effect they might have on maintenance. In all probability, he said, the results of the brake tests will renew the problems relative to the design of draft gears. In conclusion, he questioned the advisability of road tests of air brakes duplicating rack tests and in this connection spoke of the need of further study as discussed in Mr. Down's paper of the problem of getting the air to flow through the brake pipe.

Canadian National Apprentice System

(*Continued from page 255*)

of the work such as the calculation of horsepower and tractive force and the study of hydraulics and physics. Instruction is given on the subject of locomotive theory from specially prepared text books pertaining to practical shop work, valves and valve setting, and all fittings and appliances such as boosters, stokers, feedwater heaters, superheaters, lubricators and steam-heating systems. Maintenance-regulation books for both motive-power and car departments are on hand in all class rooms.

The apprentice examiner, in addition to examining all new apprentices before entering service, examines all apprentices before they receive their semi-annual increase in pay. The examinations are given on the three main subjects taught in class room—namely: drawing, mathematics and shop theory—and all are required to make 50 per cent in each subject as a passing mark. If an apprentice fails to obtain the necessary grade he is given a second trial at a later date and if he fails the second trial he is subject to dismissal. The apprentice examiner is undoubtedly one of the most important factors in the apprenticeship system. As all apprentices realize they must come before him twice a year they all do considerable home study in addition to class work to fit themselves for this important test.

The examiner submits an annual report which, when taken in conjunction with the class and shop instructors' reports concerning each apprentice, makes an excellent basis upon which to plan the selection of apprentices for certain lines of work for which they seem especially adapted. Those of more than ordinary ability and character are easily discernible through their work and are given particular attention. The information thus brought to light is used by the management when selecting men for promotion. In fact, the Canadian National apprenticeship system has made it entirely unnecessary for the management to go outside of the company when selecting mechanical foremen or departmental officers.

EDITORIALS

Anatomy of a Box Car

IN this issue we are including a drawing showing the anatomy of an A.R.A. double-sheathed steel-frame box car in response to numerous requests from our readers for a drawing of this kind. On it are shown by reference numbers one hundred fifty-three of the principal parts. The drawing shows the underframe and roof constructions; a horizontal section through the side and end; vertical sections; the foundation brake rigging and the trucks.

Specifications- Why Write Them?

ON some relatively small railroads—and on some not so small—when new locomotives or cars come from the builders' plants the finished product rarely meets the railroad company's original specifications, except in a most general way. The mechanical engineering forces of the railroad spend a lot of time writing car and locomotive specifications in detail, going so far as to insert in the specifications references to drawing numbers of the parts which the carrier would like to have used for the sake of standardization. These specifications are sent out for competitive bids and the successful bidder then proceeds to write another set of specifications including references to part numbers for which the builder has patterns, dies, formers, etc. The railroad, in turn, either accepts or rejects these suggestions and the construction of the equipment gets under way. During construction and erection the railroad company's inspectors at the builder's plant wire back several times for permission to substitute parts or materials for others not readily available. And so the process continues until, upon delivery of the equipment, the railroad acquires several new locomotives or cars and a new collection of blue prints to fill up the files in the mechanical engineer's office.

Locomotives are purchased to perform a service and that service is produced in ton-miles, car-miles or more or less routine yard movements most efficiently under conditions which are usually subject to fairly close definition. The question has been asked on several occasions why it would not be more sensible for the railroad to specify briefly what type of equipment is needed and under what conditions the service is to be performed and then let the builder submit detailed specifications which the mechanical engineer of the railroad could study at length and accept or reject as a whole or in part.

The big job of the railroad is to operate equipment efficiently in the transportation of passengers and freight and in the process of operation much is learned by experience that indicates how equipment can be improved in design in a manner that will result in more economical maintenance. Broadly stated, the purpose of the specification for each new order of equipment is to retain those features the value of which has been demonstrated by experience, and to effect improvements in and to eliminate difficulties of operation and maintenance by changes in others. A rigid set of specifications which sets forth in detail the means by which such improvements are to be effected, deprives the railroad of the benefit of the builder's experience in dealing with the same difficulties under a wide variety of conditions. In practice the builders seldom refrain from offering suggestions which lead to alterations in the specifications. Why, then, write them? Some splendid results have been obtained under specifications which set forth the general conditions to be met and the ultimate objectives to be obtained, leaving the builders unhampered at the outset except in respect to the basic standards of the railroad.

A.S.M.E. Is Fifty Years Old

THE week of April 12 marked an epoch in mechanical engineering when the American Society of Mechanical Engineers celebrated its fiftieth birthday. This celebration which began in New York, journeyed to Hoboken, N. J., and ended in Washington, D. C., afforded those who had the privilege of participating, the opportunity to secure a broader knowledge of engineering accomplishment; to see the work of many pioneers in the field of mechanical engineering re-evaluated in the light of their contributions to human welfare, and to learn that international relationships between engineers were being strengthened through adequate and proper recognition of achievement. Aside from the sentimental aspects of such events, an occasion of this nature always affords an opportunity to take stock of what has been accomplished as a guide for future effort.

The A.S.M.E. has done outstanding work in the establishment of codes, sponsoring standards and fostering research. At the present time the society has a total of 356 technical committees of which 14 are boiler code, 21 power test code, 77 research, 24 safety and 220 standardization. A total of 1,495 engineers serve on these 356 committees. It is interesting to note that of this committee membership 654 are members of the A.S.M.E. and 841 are non-members. The society, through the American Standards Association, cooperates with 207 professional societies, trade associations, governmental departments and other organizations in its technical committee work. There is an increasing demand for the establishment of codes for the performance testing of prime movers and auxiliary apparatus. Such codes, to be effective, must represent a consensus of opinion and the policy of the A.S.M.E. to cooperate, with other societies and associations has achieved real results. Research was added to the activities of the society in 1909 when a Standing Committee on Research was established under the chairmanship of the late Dr. W. F. M. Goss who was one of the pioneers in locomotive research and development. The development of the society's research activities was partly in response to the demand of organized groups of engineers in the society, such as the Railroad Division, which urged the setting up of certain research projects for cooperative study.

The American Society of Mechanical Engineers is to be congratulated on its past record of achievement. Although the conservatism of its policies has been ir-

ritating at times to many of its members who are young in age and experience, still the axiom "slow but sure" undoubtedly describes the wisest policy for the future. Recent years have seen the development in society activities of a happy combination of the wisdom and experience of the older men and the energy and zeal of the younger members. May its work continue to be guided by a vision of service to the profession and to society in general rather than by a desire for mere size as measured by the number of its members! The *Railway Mechanical Engineer* extends its best wishes to the American Society of Mechanical Engineers and sincerely hopes that the record of the second fifty years will be as noteworthy as that of the first.

What Makes a Job Desirable?

ON the Reader's Page of this issue we print a letter from a correspondent who takes exception to the opinions expressed in an editorial in the April, 1929, issue entitled "Is There a Future with the Railroads?" The writer bluntly states that "the future is so lacking that it is certainly foolish for a young man with educational advantages to aline himself with a railroad mechanical department if he is at all competent to compete in the industrial field with young men having similar advantages."

Whether or not others agree completely with this opinion will depend upon the objectives the attainment of which they consider to be essential to a successful life. To the writer of the letter success is measured in terms of dollars and dollars only. To others in varying degree this may not seem to be an entirely accurate basis of appraisal.

The editorial with which our correspondent so completely disagrees ventured to suggest certain types of satisfaction with one's job as a mechanical-department supervisor which cannot be measured in terms of dollars. For instance, there is the satisfaction which comes from doing the things one likes to do. There is the satisfaction which comes from mastering difficult situations, of which there are no lack in the mechanical and car departments of the steam railroads. While much of the romance of the pioneer days of railroading has passed to other lines of endeavor, there are still many features of steam railroad transportation which have a strong appeal to the imagination. There are also the questions of working conditions and transportation privileges. All of these and, no doubt, many more factors must enter into the equation in appraising the value of a job in the mechanical department, and the relative weight to be given to each of these factors will depend upon the philosophy of each individual making the appraisal.

So much for the situation from the viewpoint of the individual. Taking the matter up from the viewpoint of the railroad itself, it must be said that our correspondent's emphasis of the dollar value of a career in that department should be given most careful consideration. It is undoubtedly true that over a considerable period of years the relative ability of the men retained in the mechanical department throughout their active careers will tend to seek a level in keeping with the relative dollar value of that career to the individual in competition with careers in other industries involving similar interests and requiring similar talents. The question for determination is whether or not our correspondent is correct when he says "A man with the same ability to forge ahead would probably be more successful in some other line of work and be able to command a much higher salary when at the peak of his power."

The statement itself indicates a lack of specific information and leaves the advantages of other industries undemonstrated. Using as a test one's "salary at the peak of his power," it must be said that the rate of advancement for a person of given ability depends to a large extent upon whether or not the industry in which he is employed is expanding, or has reached a development of relative stability, or is contracting. For the present, at least, the railroads have reached a development of relative stability in which forces are neither increasing rapidly or contracting rapidly. How many industries requiring mechanical talents comparable with those required by the railways are in the early stages of their development? Is there any reason to believe that greater success, measured by the dollar value, is likely to be attained in those industries which, like the railroads, have reached their growth and have become stabilized?

We shall be glad to have more of our readers express their opinions on this important matter as frankly as this month's correspondent has done.

Cost of Journal Lubrication

THE editorial in the February issue has raised the question: How should the cost of car-journal lubrication be shown? On a basis of new oil only or on a basis of what is generally termed "box-to-box"? A number of roads use the first method, claiming that lubrication costs figured on the basis of new oil consumed affords a better comparison with preceding years when the amount of new oil used was the largest item of expense in journal lubrication. The lubrication costs per 1,000 car-miles given in the editorial referred to were on a basis of new oil consumed and were not determined by the box-to-box method.

The latter method is based on the cost of lubricating cars in train service, as included in Account 402, which covers the cost of inspecting, repacking and oiling car journal boxes. This also includes such items as labor, shop expense, telephone service, stores expense, power plant operation, electric current and other miscellaneous expenses charged against the operation and maintenance of a plant for reclaiming or renovating used journal-box packing. Of course, no charge is made for renovated oil or waste but only for new oil and waste used to make up losses occurring in the renovating process. This loss is between 15 and 20 per cent in the modern renovating plant, and cannot be much less if the work is properly done.

Estimated on the basis described in the preceding paragraph, one road reports its freight-train lubrication costs to average 50 cents per 1,000 car miles and its passenger-train lubrication, about 80 cents. Another road reports 55 cents per 1,000 freight-car miles and 65 cents per 1,000 passenger-car miles. These figures, which include box-to-box costs, are considerably higher than those given in the February issue; namely, three cents per 1,000 passenger-car miles and two cents per 1,000 freight-car miles.

Renovating Costs Must be Considered

It costs one road about $1.10 per 100 lb. to renovate its packing, including the manufacturing of back-end rolls. The costs on another road have run as high as

$1.86 to do the same work. Taking the last road as an example, because it has the higher cost of the two, this road shipped about 5,700,000 lb. of used packing to its renovating plant during one year. There was removed from this amount of used packing in the process of renovation by weight, 9.4 per cent dirt and 2.64 per cent babbitt. New oil, amounting to slightly over 6,000 gal. was added to the renovated waste, and over 5,000,000 lb. of prepared packing was turned out of the plant. The old oil was put through a filtering process and returned to service. The *net* cost of reclaiming this amount of packing, including the cost of the new oil amounted to over $93,000. According to estimates made by the accounting department, it would have cost $243,500 to have produced 5,000,000 lb. of packing from new materials. The road saved over $150,000 during that year through the use of renovated packing.

Filtering the old oil was not satisfactory, so an improved process of renovating oil was placed in operation by this road the following year, which met the requirements of Rule 66. This process increased the cost of renovation 10 cents per 100 lb. Had this process been in effect during the preceding year, the cost of renovating 5,000,000 lb. of packing would have been increased by $5,700. The oil renovating process discards approximately 20 per cent of the dirty oil. Replacing this loss would require approximately 104,000 gal. of new oil at a cost of about $15,000, which would increase the net cost of reclaiming from over $93,000 to a little over $114,000. This, however, would still mean a saving to the railroad of about $129,400 by using renovated packing.

New Oil Used Affords No Comparison

The fallacy of showing the cost of car-journal lubrication on a basis of new oil used is very evident from the preceding statements of fact. Such a figure does not even afford a basis for comparison. In fact there are a number of possibilities where the cost of new oil can be entirely out of line, not only with the cost of renovating packing but also with the total cost of car-journal lubrication. Furthermore, it is possible to manipulate the numerous operations entering into car-journal lubrication so as to reduce the consumption of new oil per 1,000 car-miles. Of course, such manipulation will eventually show up in the hot-box report, for the simple reason that new oil must be added to make up losses in renovation.

A study of the monthly reports from one road, of used waste received at the plant, oil and waste restored to service, and even the quantity of new oil used, shows that there is no apparent relation between the monthly consumption of new oil and the car-miles. This also holds true for the monthly figures of car-miles per hot box, and car-miles per pint of oil.

The many factors entering into the lubrication of car journals, especially on roads having modern plants for renovating oil and waste which produce prepared packing to meet the A.R.A. specifications for renovated oil and waste, require improved methods of administration. As was pointed out editorially in the March issue, the installation and operation of a renovating plant, either by the railroad or by a contracting company, involves a considerable outlay of money. It is, therefore, necessary to have some system of accounting in order to determine whether a profit is being realized on the transaction.

That editorial concluded with the statement that a careful study of the problems involved will show that the human element is the most important factor in successful journal-box lubrication. Proper instruction, close supervision, with special attention to details, the furnishing of good lubricating materials and periodical attention to journal boxes have been demonstrated to be the only satisfactory means of solving the hot-box problem.

NEW BOOKS

WORK ROUTING IN PRODUCTION. *By John Younger, professor of Industrial Engineering, Ohio State University. Published by the Ronald Press Company, New York. 116 pages, 5½ in. by 8½ in. Price $2.50.*

This book, which has been written for production executives and students of industrial engineering, is devoted to the development of the underlying principles of work routing, scheduling and dispatching in industrial establishments and is based upon the current practice of some leading manufacturers. Emphasis is laid on the ways in which the methods described can be applied to lower costs and how they can be fitted to widely varying conditions. Fundamental principles are explained, and practical illustrations and examples show how these principles are applied and just what results can be expected.

PROCEEDINGS OF THE AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—*Edited and compiled by the secretary, G. G. Macina, 1140 Calumet avenue, Chicago. 144 pages, 5½ in. by 8½ in. Bound in leather.*

The proceedings of the seventeenth annual convention of the American Railway Tool Foremen's Association, held at the Hotel Sherman, Chicago, September 11, 12 and 13, 1929, contains addresses by M. D. Chase, shop superintendent, Missouri-Kansas-Texas; C. M. House, superintendent of motive power and equipment, Chicago & Alton; W. R. Millican, tool foreman, Missouri-Kansas-Texas; E. B. Hall, general superintendent of motive power, Chicago & North Western, and A. N. Goddard, president, Goddard & Goddard Company, who discussed milling cutters and efficient milling practice. The reports of the following committees were presented: Standardization of boiler tools; methods and tools for repairs to air brake equipment; jigs and devices for the locomotive shop, and tools and equipment for the car repair shop and yard.

PROCEEDINGS OF THE TRAVELING ENGINEERS' ASSOCIATION.—*Edited by W. O. Thompson, secretary, Cleveland, Ohio. 344 pages.*

The proceedings of the thirty-seventh annual convention of the Traveling Engineers' Association contain all of the reports and addresses presented at the meeting held at Chicago, September 24, 25, 26 and 27, 1929. The papers discussed at this meeting were: To What Extent Have the Modern Appliances Contributed to the Economical Operation of Locomotives? Preparation and Testing of Air Brake Equipment To Insure Proper Train Handling; Trains of Tomorrow; The Better Utilization of the Steam Generated on the Locomotive in Heating and Ventilating Passenger Cars; The Development of the Mechanical Stoker; Utilization and Conservation of Available Coal and Oil for Locomotive Fuel, and Notes on Oil-Burning Locomotives. The committees for 1929-1930 and the subjects for discussion at the 1930 annual convention are listed, as are also the past presidents of the association and the subjects discussed during their administrations.

THE READER'S PAGE

Finishing Floating Bushings

COLUMBUS, GA.

TO THE EDITOR:

In the February issue of the *Railway Mechanical Engineer* a reader, who wanted to know something about lubricating floating main- and side-rod bushings, spoke of grooving bushings of this type. I think it would make the bushing too weak and would cause it to crack, as the groove would have to be made like a spiral inside and out and would have to be made too deep to hold the grease. I checked a right and left main-rod floating bushing in March that was put on a switch engine on October 28, 1928, and which was worn about 1/16 in. inside and not any in the rod fit. These bushings are roughed down to within 3/16 in. of the outside fit and ⅛ in. of the pin fit, then drilled and countersunk until they are needed for the engine, then they are fitted to .010 of the pin and rod fit. Roughing these bushings and drilling them before they are put on the engines eliminates filing and makes a smoother job.

I don't think a multiple drill head would pay to drill these bushings, as the roads do not use enough bushings for that as yet and the cost of that type of drill head would be too much.

W. E. HOWARD.

Why Some Cars Ride Hard

TO THE EDITOR:

Practical car men must disagree with much that is said by R. R. Howarth on this subject in the April issue of the *Railway Mechanical Engineer*. For example, "When a car is going around a curve the car body—must compress all of the springs on the side of the truck at the inside of the curve and then the truck vibration is all conveyed to the car body." But he has called attention to an important subject. Hard riding due to defective maintenance is a small part of it. The important problem is to design trucks so that they will ride many times as well as those best maintained do now.

Two trucks may be just alike except in their springs, and the springs may be working at the same fibre stress and yet those trucks may respond very differently to irregularities in the track. Let us speak of these two sets of springs as having different degrees of "softness."

We have all observed that truck frames are vibrating most of the time while the car is in motion. This vibration must impart impulses to the car body. Apparently this disturbance can be reduced by decreasing the weight of the truck frame and the other truck parts supported by the equalizer springs, but not by the bolster springs.

A thorough, systematic research is required touching all these features of truck design: The length, incline, and transverse spacing of the swing links; the "softness" of both the helical and the elliptic springs; the center-to-center spacing of the springs; the amount of damping friction to resist the spring action; the various forms of so-called "graduating springs"; the center plates (flat or flexible), the height of the brake shoes, and the possibility of reducing the weight of the truck frame and the parts attached to it. It is within the possibility of such a study so to improve the service as to attract passenger business.

G. E.

Favorable Comment and a Suggestion

CENTRALIA, ILL.

TO THE EDITOR:

The article appearing in the February issue of the *Railway Mechanical Engineer* on "Modern Refrigerator Repair Shop" is something I am sure will be appreciated by the car foremen in the United States and Canada, and I believe from time to time articles of this kind, covering heavy repairs to freight cars in detail, will prove to be a benefit to your organization as well as to car department supervisors of the several railroads throughout the country.

Your article on "Gaging Worn Wheels" was enlightening and I would like to suggest for some future issue that photographs of wheel defects appear in an article with a detailed account of each defect.

The articles, published under the head "Car Foremen and Inspectors," should be made a permanent part of your magazine.

In the March issue, "Draft Gear for Passenger Cars" by C. T. Ripley was interesting and brought out some real points.

"Stabilized Forces and Morale" was outstanding also the editorial on "Railroad Color Experts." This brought out an interesting matter and one that I am sure should receive more consideration from men thoroughly familiar with colors and their influence on the human mind.

"On the Firing Line" by L. J. Lewis is very good. It brings out matters that are common in every day routine in our work in car department as well as putting it in an interesting way.

Another matter which I believe would be of interest is the continued failure of center plates. I attribute these failures to poor construction of body bolsters, fabricated members failing under load, putting undue stress on the center plates and causing fractures.

When a center plate fails due to the above cause it usually results in eliminating side-bearing clearance causing severe stress on the flanges of wheels. I hardly know how you can approach this matter through an article or editorial, but it is a real expense to the railroads for when we find center plates broken, and fabricated body bolsters bent upwards, it means the cutting down of the entire bolster and the straightening of parts, which is a heavy expense, or placing a shim between the center plates and the bottom cover plate, the latter giving only temporary relief. The mere renewing of a center plate without remedying the cause of its failure is very unsatisfactory. We find this condition on cars of all railroads passing over our repair track.

The advertising matter that appeared in these two issues was placed before the railroad public in a very in-

teresting manner. I do not know when I have had more satisfaction in studying different appliances as presented by the supply companies through their advertisements in the *Railway Mechanical Engineer* than I did from these two issues.

W. J. McCLOSKEY,
General Car Foreman, Illinois Central System.

Advertising Our Business

PARSONS, KAN.

TO THE EDITOR:

The railroads, like every other prosperous and successful industry, spend a certain amount of revenue in advertising, selecting that class of advertising which, in their judgment, is the most practicable as well as economical. At the same time the writer feels that one of the most practicable, as well as economical, forms of advertising can be done through the medium of the employee. With the railroads penetrating every city and hamlet and with the great number of employees guarding those never-failing lines of transportation, there are few districts that do not have a railway representative in their midst. That representative should be informed with reference to the amount of taxes that railroad is contributing to his state and his community and the number of employees on the payroll of that railroad, as well as the amount of money dispensed annually for labor. There are many other things with reference to the operation of a railroad that every employee should know, because all these things are of interest to the taxpayer and, once these real truths are known, a better feeling will be developed toward the railroad, and a greater respect means more business, because there are today people using other means of transportation who would use the railroads in preference if they knew the facts.

The cost of distributing form letters to each employee would cost but a fraction more than one cent per employee, and were the matter so handled that one letter per month per employee discussing but one subject each month could be sent out, these facts would soon be a topic of discussion and looked forward to with interest. Were such a system of advertising once inaugurated, I firmly believe the results would be surprising.

J. P. O'CONNOR,
Write-Up Clerk, Missouri-Kansas-Texas.

More Conveniences Would Attract Passengers

TWIN CITIES, MINN.

TO THE EDITOR:

I am quite in accord with the statement in the editorial on coach seating facilities in the *Railway Mechanical Engineer* for February, that the seating facilities in many of the railway coaches leave much to be desired in the way of comfort, and the same thing would also apply to the seating facilities in many of the older parlor and lounge cars. As a matter of fact, many of the older types of parlor and lounge cars are operating at the present time with chairs that are much more uncomfortable than the ordinary first-class coach seats.

I recently rode in one of the eastern de luxe coach trains and was much impressed with the improvement in the seating and other facilities. The bucket-type seats and the individual ventilators in the sash add considerably to the comfort of the passengers. The double rotating reclining chairs with the soft springy seats are certainly a big improvement. I noticed that many passengers used them facing the windows. This kind of seat, of course, requires more space, which reduces the seating capacity per car, but this should not be objectionable as the majority of the coaches are operated with many of the seats unused, and it is a common occurrence for one passenger on a night run to occupy two full seats, which normally would seat four people.

I do not think there is any question at all but that the coach travel could be increased if more attention were paid to the passengers' comfort, and this does not apply alone to the seating facilities—easily operated window sash or individual ventilators in the window sash add to the comfort of the passengers. Many coaches are still operated with no fans and without soap or towels for toilet purposes. These items, of course, all add to the comfort of the traveling public.

SUPERINTENDENT CAR DEPARTMENT.

Inspecting Main Trackers

CHICAGO.

TO THE EDITOR:

I was much impressed with the article appearing in the January issue of the *Railway Mechanical Engineer*, and also the comments in the March number. While we have never had the main-track inspection, we have for years been preparing trains so that empties would move to the coal fields, about 300 miles, and loads to destination without further shopping. The number of cars handled during peak business averages about 1,900 a day. All inspection and repair work are done on the inbound movement. Trains inbound are worked from both ends with a force of 15 men on each shift as follows: Four car inspectors, four car repairmen, five air brake repairmen and two outbound air brake inspectors. The inspectors give all open-top cars Class A inspection. All other cars receive Class A, including top inspection, refrigeration reports, and the inspectors chalk the necessary repair work for the repairmen. The repairmen carry bolts, nuts, cotters, and ratchet keys, in addition to the following tools: Sledge, winding wrench and bar for winding and hooking up Wine type doors. In addition, heavy material, such as door pins, shoes, shoe keys, brake hangers, etc., are available in the yard. The yard air test plant is applied near the middle of the train for the air brake repairmen who inspect and repair leaks, cut off and set brakes (four cars at a time) inspect and adjust piston travel, repair broken retaining pipes, release rods, and shop all cars found defective. The average time for inspecting and repairing from 100- to 115-car trains is about 1 hr. 15 min. per train. The trains are then switched and very few cars are thrown out of make-up trains.

The problem of inspecting trains after they are made up is entirely out of the question, especially when as many as 15 or 20 cars are shopped out of one train. The time consumed for outbound inspection is about 45 min. These trains are given a standing air brake test and Class B inspection at a terminal prior to being distributed to the coal fields. All cars found with inoperative brakes, or brakes which have leaked off, are shopped out. The average number of cars shopped out during a month is about 2.5 cars per train. If these

trains were being main-tracked through such a terminal, there would be practically no cars shopped out.

You will note that we employ almost twice as many men as the author of the article in the January issue. We insist that the inspection work be thorough and that all light maintenance work be properly taken care of. I agree with the author that if trains are properly inspected and made ready, there is no reason why they could not be handled in main-tracker service as successfully as passenger trains.

PROGRESSIVE.

A Future with the Railroads?

CLEVELAND, OHIO.

TO THE EDITOR:

An editorial in the April, 1929, issue asks the question "Is there a future with the railroads?" In it you proceed to answer the question in the usual smug and self-satisfied manner you assume when handling a subject with which you have little familiarity.

I will not discuss the subject so far as the transportation department's troubles are concerned, as my experience covers mechanical-department work only. I am of the opinion that there is little, if any, opportunity in the mechanical department for a brilliant future. The incentive for the future is so lacking that it is certainly foolish for a young man with educational advantages to aline himself with a railroad mechanical department if he is at all competent to compete in the industrial field with young men having similar advantages.

The statements herein are not made from a "sour-grape" point of view, as the writer is well satisfied that he has advanced as rapidly on the railroad with which he is connected as has any employee on any other railroad. But, after one gets to the top in the mechanical department he has failed to arrive anywhere in particular *financially,* which is the important feature. High-sounding titles do not buy the baby shoes and unless one is eventually able to command a high salary he has not succeeded.

A number of railroads take technical-school graduates and give them special training with the idea of eventually having technically-trained supervision. These men are usually placed on a small monthly salary during their training period and then, as vacancies in supervisory forces occur, the specially-trained men are given opportunities for promotion to these vacancies.

Let us consider the conditions on an average railroad and see where these boys can get. The average railroad has as head of the mechanical department a mechanical superintendent, and he, in turn, probably has a superintendent of car department who assumes the responsibility for the direct operation of the car department. At various division and shop points he also has master mechanics and their usual staffs.

If the young man starts in the car department, he will have on the debit side of his account eight years in grade schools, four years in high school, four years in college and three years as a special apprentice. Thus, he has used nineteen years of his life in securing an education which is to support him the balance of his three score and ten. Assuming that his education began at the age of six years, a total of 25 years has probably elapsed, or 35.7 per cent of his probable life.

We will assume that he is given a foreman's position at, say, $225 a month immediately upon completing his special apprenticeship (which is very unlikely). There are probably six other foremen in this shop with whom he must compete and, assuming that the road has five such shops, he has one chance in thirty for promotion to a higher supervisor's position, say as general car foreman. Assuming that this man is *the* one in thirty, it is not at all likely that he will attain a general foreman's position in less than ten years. During this period his earnings have been somewhere around $3,000 a year and 35 years, or 50 per cent, of his life has passed.

Now, as general foreman he is in line for the position of superintendent of the car department in competition with his four brother general foremen and special men on the staff of the superintendent of the car department, who will probably number five, so his chance is one in ten (optimistically speaking) of becoming superintendent of the car department. He will probably work as general foreman for another ten-year period, earning a salary of $3,600 a year, and will have used 45 years of his life, or 64.7 per cent.

We will again assume that this man leads all the others and becomes superintendent of the car department at a salary of around $6,000 a year. He is now all dressed up and no place to go. It is very unusual for a man from the car department to take the step into the mechanical superintendent's position, but it has happened and, if such is the case here he will step into the $10,000 position and probably get no further, as it is also unlikely that a mechanical man will get into the operating department, which is the next step.

Well, this man has not done so badly, but the others have stalled along the road. True, some of them will not be competent, but the fact remains that the opportunities are restricted so as to make the odds against getting the jobs with a decent remuneration too high to buck.

A man with the same ability to forge ahead would probably be more successful in some other line of work and be able to command a much higher salary when at the peak of his power.

Your editorial has the usual line of bunk relative to the satisfaction one finds in the exercise of his faculties and knowing that he is bigger than his job, etc. But I repeat that if one is not getting the money, he is not doing himself any good, regardless of where he is in life's pathway.

I recall some years ago I had a young friend who had a position with the world's largest mail-order house. I met him one day and said, "Well, Earl, how are you coming?"

He went on to tell me that he was doing fine and had just received a nice promotion. I congratulated him and asked regarding his old and new positions. He told me that he had formerly been an assistant department manager, but had been promoted to department manager.

"That's fine," I said, "I suppose you got a nice increase in salary?"

"No," he replied, "but I have two more men working under me."

He had the satisfaction of exercising his faculties to organize and to lead, but it didn't do him a lot of good. You would probably assume that there was a good future with that organization also.

R. R. HOWARTH.

THE CANADIAN NATIONAL has completed the construction of a first-aid instruction car that will be used to extend first-aid instruction to outlying sections of the system.

With the Car Foremen and Inspectors

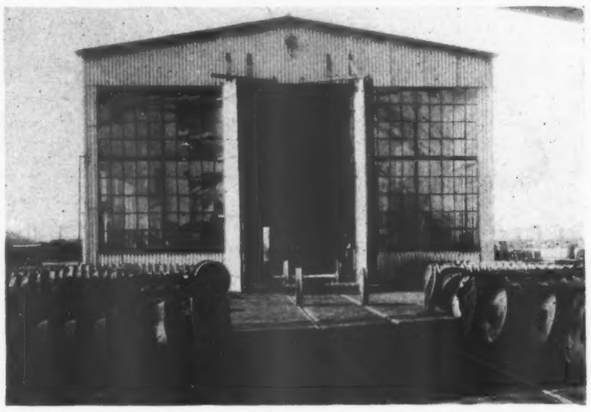
Frisco Wheel-Shop Work

ALL car and engine-truck wheel and axle work, except the turning of steel-tired wheels, on the Southern and River divisions of the St. Louis-San Francisco is handled at the car-wheel shop of the Yale terminal, about 10 miles west of Memphis, Tenn. This comparatively new shop, with a force of three machine operators and two wheel-press men, supplemented by a floating labor gang, which assists in loading, unloading and handling wheels and axles, turns out approximately 14 pairs of cast-iron wheels, or 10 pairs of steel wheels, in eight hours. At the present time, the shop is being operated on three shifts in an effort to get 300 to 400 pairs of wheels ahead in anticipation of a heavy program of rebuilding.

The wheel-shop proper occupies one end of a building contructed largely of sheet metal and glass and equipped with Niles-Bement-Pond machinery, including one combination axle and journal lathe, one light axle and journal lathe, one car-wheel boring machine and one 300-ton single-acting wheel press. The machines are provided with the usual jib cranes equipped with pneumatic hoists for handling heavy wheels and axles. All machines are belt-driven, except the heavy-duty axle lathe, which takes its power from a 15-hp., direct-connected electric motor. This machine, designed with gaps in the ways, permits turning cut journals without dismounting the wheels. The gaps are closed when turning wheel seats, thus giving complete support to the tool carriages.

Labor Saved in Handling Wheels and Axles

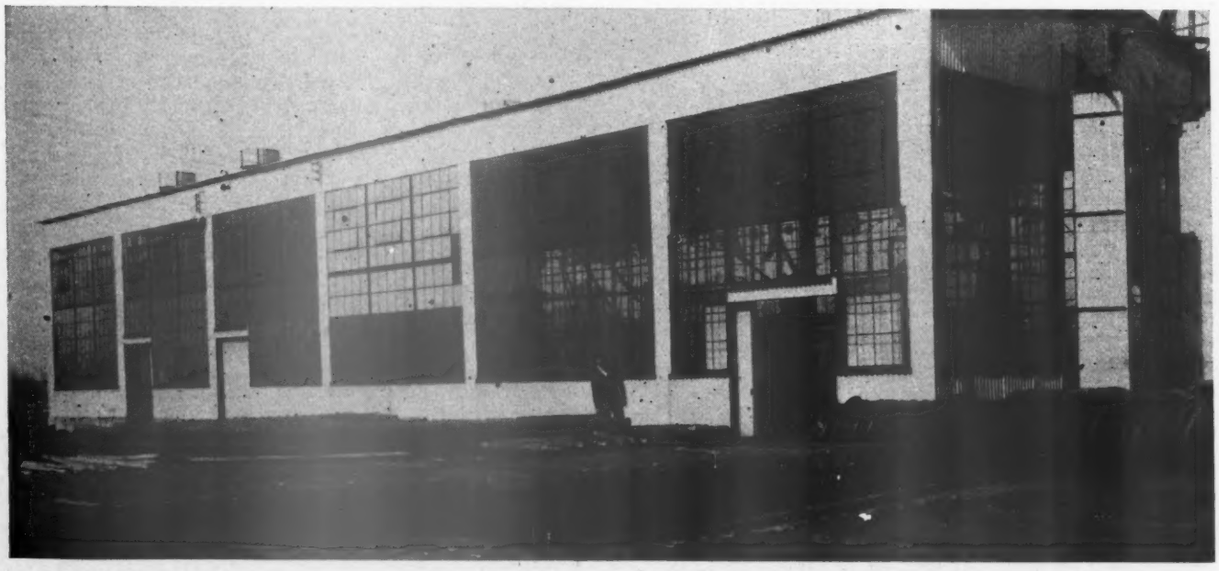
The external shop facilities consist of wheel and axle storage platforms, constructed of heavy timber adjacent to the wheel-shop building, a supply track to the main shop door, a delivery track north of the shop, three wheel storage tracks east of the shop and a loading and unloading platform equipped with a monorail pneumatic hoist which crosses all supply tracks. New loose



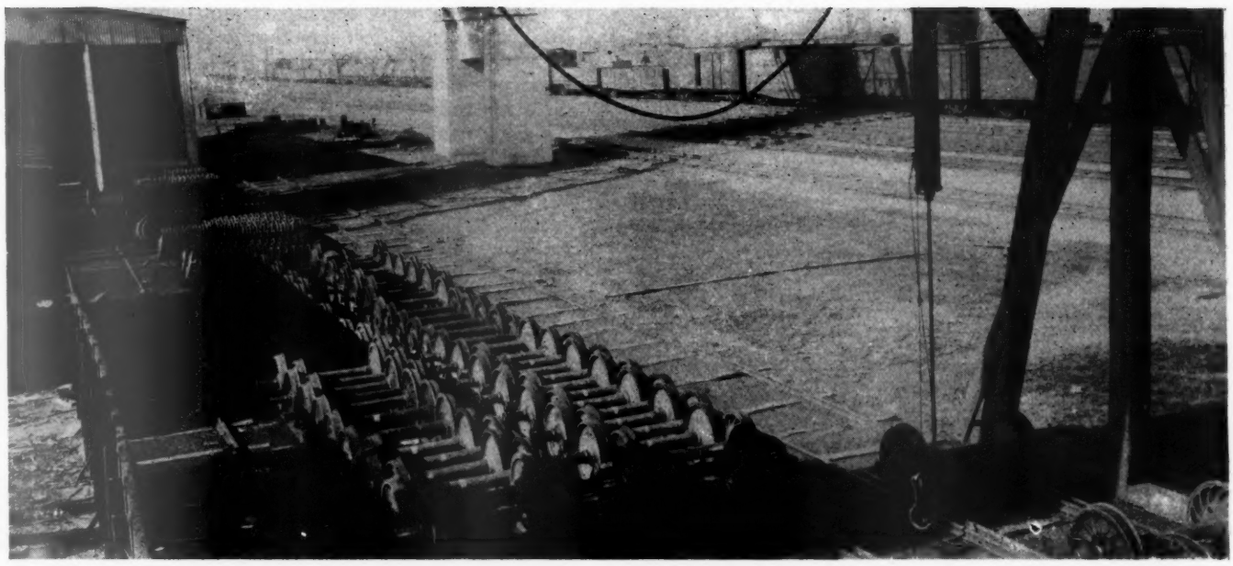
Single-wheel storage platform and shop supply track

wheels are received at Yale terminal in both house and open-top cars. In the former case they are rolled onto the car-level platform and down a ramp to the storage space. If received in open-top cars, the wheels must be handled by the pneumatic hoist onto the platform. Axles, usually received in house cars, are unloaded and rolled down inclined ways to the axle storage space. Mounted wheels are inspected and placed on the shop supply track by the floating gang, down which they work by gravity to the shop, as needed.

In the shop, the wheels are swung into the press by



Modern, well-lighted car-wheel shop building on the Frisco at Yale, Tenn.—Wheel and axle storage platforms are shown in the foreground



Mounted-wheel storage tracks and pneumatic hoist—The s tandard-gage track passing the north side of the shop delivers wheels to the repair yard

means of a wheel stick, one wheel pressed off, the wheels reversed and the other pressed off, both wheels and axles being worked out a side door in the south side of the shop. Scrap wheels and axles are kept together for subsequent loading, as are also those fit for subsequent use, and stored by size.

The two press operators can press off and on 21 or 22 pairs of wheels in eight hours, which is in excess of the usual shop requirements, so they do most of the wheel and axle handling in the shop and place enough work ahead of the boring mill and axle lathes so that it is not necessary to run the wheel press on the extra shifts. Loose wheels are handled by the usual method of rolling. Axles are handled by a two-wheel truck with the usual pick-up tongs and balancing arrangement.

The practice in the case of all second-hand axles is to take a light truing cut over the wheel seat and bore the wheel enough to make the force fit in accordance with standard practice as prescribed in the Wheel and Axle Manual. Inside micrometer calipers are used to check the wheel bore, which is machined with a Davis boring bar giving micrometer adjustment to the double cutters. All journals are rolled with a single roll held in the wheel lathe tool post.

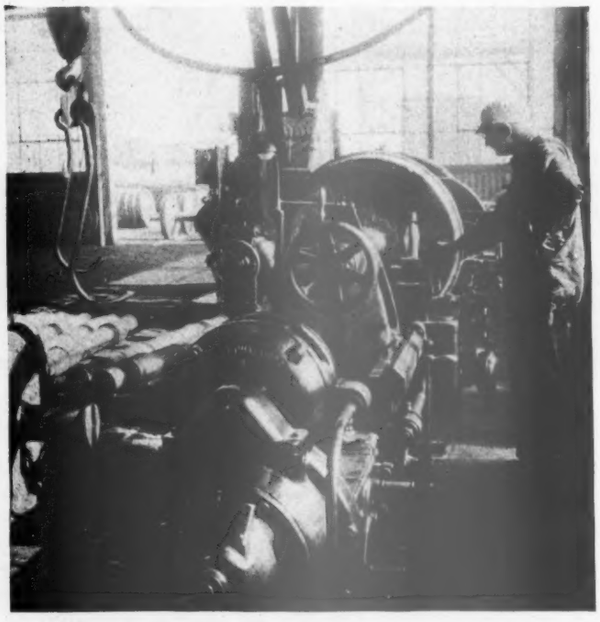
To promote smooth shop operation, which implies freedom from interference and lost motion, the mounting and dismounting of wheels are kept entirely separate. When dismounting, the flow of wheels is entirely toward the shop, and, when remounting, the flow is reversed to the wheel storage tracks. The supply track to the car repair yard, just north of the shop, is also always kept open, except for short periods when wheels are moving directly to the yard. Wheels are delivered from the track to the repair yard early in the morning and the track is available for the rest of the day for movement of defective wheels with flat spots, cut journals, broken collars and other defects, back to the wheel shop.

Program Work

The St. Louis-San Francisco is planning in the near future, if it has not already started, to build at the Yale terminal 300 low-side composite gondolas of 100,-

Car-wheel borer and smaller axle lathe—Two-wheel truck for handling axles is shown in front of the lathe

000-lb. capacity, in which practically the only second-hand material will be the brake cylinders. Remounted wheels and other materials are now being stored in anticipation of this work. Six-hundred new Scullin A.R.A. standard bolsters and 1,200 truck sides, also 600 Miner A-22-XB draft gears, are already on the ground. Twelve-hundred A.R.A. No. 2 Plus Ajax



Heavy-duty Niles-Bement-Pond combination axle and journal lathe

brake beams are on hand; also one of the illustrations shows part of about 616,000 ft. of creosoted decking intended for the decking in all open-top cars.

Decisions of Arbitration Cases

(The Arbitration Committee of the A.R.A. Mechanical Division is called upon to render decisions on a large number of questions and controversies which are submitted from time to time. As these matters are of interest not only to railroad officers but also to car inspectors and others, the Railway Mechanical Engineer will print abstracts of decisions as rendered.)

Credit for Brake Beams Claimed Non-A. R. A.

On August 13, 1928, the Southern Pacific made repairs to the North American Car Corporation car 1195 that included one new No. 2 A. R. A. brake beam. The repairs were made on account of worn brake heads, the owner being credited with a non-A.R.A. beam because it was not properly stamped A.R.A. on the strut. The S.P. contended that this omission alone was sufficient to allow credit for a non-A.R.A. beam although it otherwise met all the requirements of a No. 2 A.R.A. beam. The owner objected to the credit for a non-A.R.A. beam when a No. 2 A.R.A. beam was removed, regardless of the fact that it was not stamped as such. The owner stated that it was quite possible that the beam had been applied before stamping became a requirement of the rules.

In rendering a decision the Arbitration Committee stated that "The classification of brake beams for billing purposes is covered in brake-beam identification tables under Rule 101 and, as the brake beam in question conformed to the No. 2 beam, it should be so credited." —*Case No. 1630—North American Car Corporation vs. Southern Pacific Company.*

Classification of a Destroyed Car

The Chicago, Milwaukee, St. Paul & Pacific car 30053, a wooden underframe gondola, with the exception of two metal center sills which did not have any cover plates, was damaged on the Chicago & North Western on August 3, 1928, and depreciated value requested from the car owners under A.R.A. Rule 112. A description and the valuation of the car was furnished by the C., M., St. P. & P. under Class E-4 to which the C. & N. W. took exception, contending that the construction of the car did not conform to any of the specified classes as defined in Paragraph 1, Section B, Rule 112, and therefore Paragraph 2, Section B, of the rule applies and that settlement should be made on the basis of an all-wood car under Class F. The owner contended that the construction of the car was equal to the requirements for Class E-4 in that the draft stops were attached directly to the webs of the steel center channels and that the channels, 15 in. in depth and weighing 33 lb. per foot, were continuous from end sill to end sill, their continuity being unbroken at the bolsters and the channels being tied together at intervals.

The Arbitration Committee rendered the following decision: "The status of this car, for settlement purposes, on basis of Rule 112, is Class E-4."—*Case No. 1631—Chicago & Nortn Western vs. Chicago, Milwaukee, St. Paul & Pacific.*

A Car Destroyed by Fire

Canadian National Eastman Heater car 230041 with its contents was destroyed by fire on December 14, 1927, in the Maine Central yard at Vanceboro, Maine, which is a port of entry to the United States from Canada. The car was delivered to the Maine Central by the Canadian National at 1:40 a. m., was inspected by the Maine Central inspector and approved as to mechanical condition, the heater apparatus being unlighted. At 5:15 a. m. an Eastman Heater employee placed oil in the heater and lighted it. At 10:30 a. m. the fire which consumed the car and its contents was discovered. The Maine Central contended that, as the United States customs officers had not cleared the shipment, the car was not in its possession and that it would not be until all the formalities of customs clearances had been completed. The Canadian National contended that the car was in the possession of the Maine Central, that this road was responsible for the destruction of the car, basing its contention on Interpretation No. 2, of A.R.A. Rule 2 as well as Arbitration Cases 1159 and 1538, and that settlement should be made by that road under A.R.A. Rule 112.

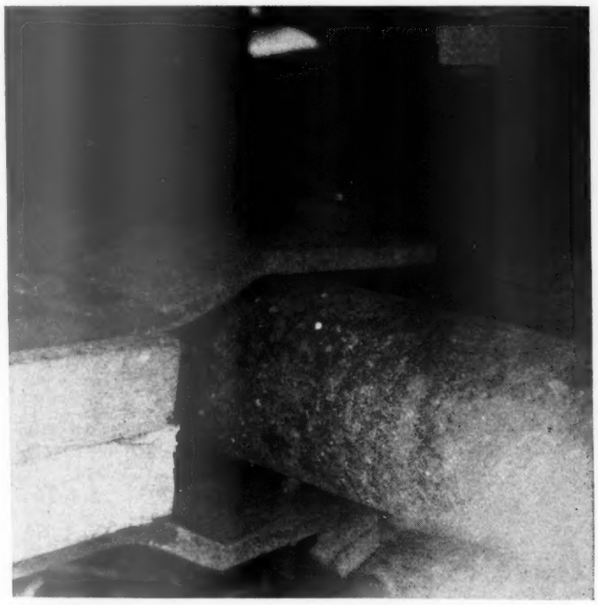
The decision as rendered by the Arbitration Committee is as follows: "The Maine Central is responsible. Interpretations 2 and 3 of Rule 2 apply."—*Case No. 1629—Canadian National vs. Maine Central.*

THE BOSTON & MAINE recently took up a piece of track that was laid inside a paint shop at Concord, N. H., about 1869. It consisted of 3½ in. rails, laid on stone ties, with the spikes leaded in, and it was necessary to use an acetylene torch to cut the spikes before the rails could be removed.

Straightening Bulging Ends

IT is a simple matter to take the bulge out of a car end if the steel end can be removed from the car, but this is not always desirable or economical. One of the car repairmen at the Frankfort, Ind., shops of the New York, Chicago & St. Louis has worked out a simple device which serves effectively to take out, or rather "push in," the bulged ends.

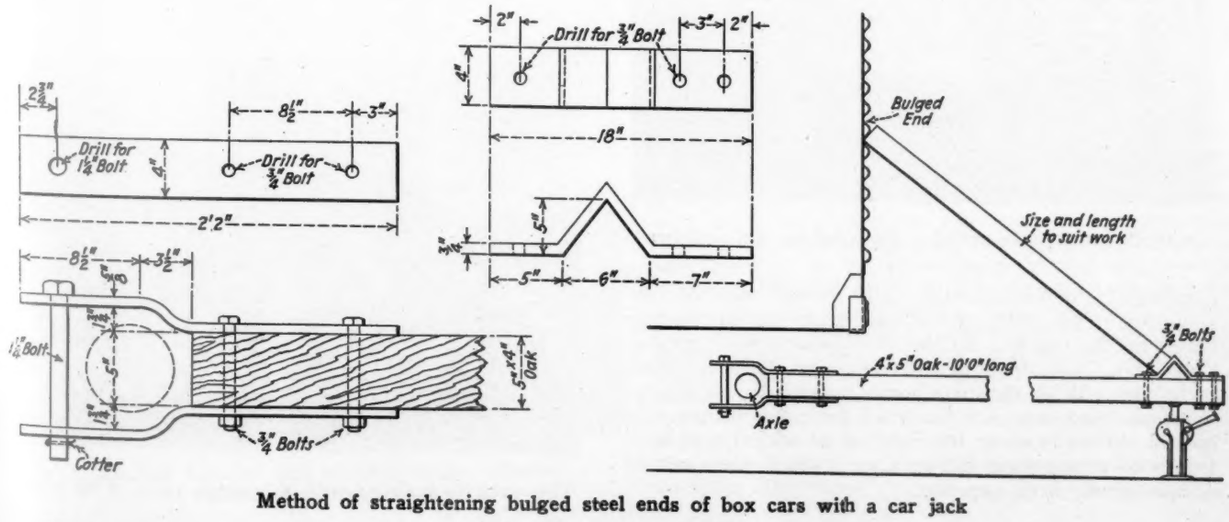
The entire outfit consists of two hardwood beams and an ordinary car jack. The pictures show how the device is constructed, how it is put in place and how it works. The lower beam is made of 4-in. by 5-in. oak and at one end is a yoke which straddles the car axle. This yoke is fastened to the axle by a 1¼-in. bolt through the two jaws of the yoke. Near the other end of the lower beam there is a ¾-in. by 4-in. strap iron bracket so shaped as to permit the end of the upper beam to rest against it. This bracket is securely bolted to the beam. The upper beam is placed between the bracket and the car end to be straightened and it consists of a single member of a length suited to the position of the bulge in the car end which is required to be pushed in.



A close-up view of the yoke around the car axle

The device is used by fastening the yoke on the end of the lower beam around the car axle and resting the other end on the head of a car jack. The upper beam is placed against the bracket on the lower beam and against the car end. By raising the jack the bulged end is forced in any desired amount. The illustration shows the device straightening a corrugated car end. The

One end of the upper beam rests against a bracket on the lower beam



Method of straightening bulged steel ends of box cars with a car jack

square end on the upper beam is not well suited to fit down into the groove of the corrugation, therefore, it was necessary in this case to place a piece of round iron

After assembling the beams the car end is straightened by raising the jack

under the end of the beam. The end of the upper beam could be improved by shaping it to fit the groove of the corrugation.

Spraying Oil on Car Trucks

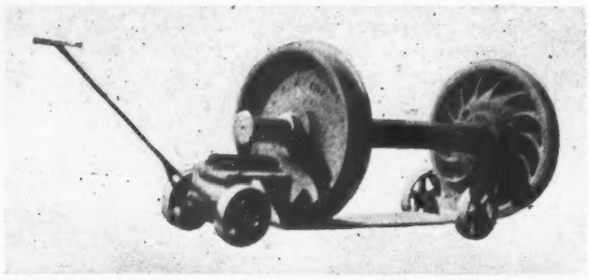
THE New York, Chicago & St. Louis keeps its passenger-car trucks in good condition by spraying them at the coach yards with thinned used oil. Formerly this work was performed in a tedious manner by

A truck spray made out of a discarded fire extinguisher

applying the oil with a brush. This method was not only slow, but it was difficult to reach many out-of-the-way places on the trucks. At the Broadway coach yards at Cleveland, Ohio, the apparatus shown in the illustration is in use. With this equipment, which an ingenious workman made out of a discarded fire extinguisher, it is possible to easily spray the light oil on all parts of both trucks of a passenger car in a very short time, and at comparatively little expense.

A Truck for Car Wheels

THE car wheel truck illustrated has been named the "Wheel Lizard" by the employees of the road on which it is used because of its singular shape and design. This truck consists of an 8-ft. slab of 1-in. by 10-in. iron that is bolted to the under side of a rear axle and to the top of a front axle and supported by wheels that are 11 in. in diameter. The slab of iron has inden-



The truck facilitates the handling of single pair of wheels where no crane is available

tations on the top side that are ⅜ in. deep with a contour to fit the flange of the wheels. These indentations prevent the wheels from rolling off while in transit and serves as stops when loading the wheels on the truck. The truck affords a satisfactory means of conveying a single pair of wheels in a shop where no crane is available and where the floors are in good condition.

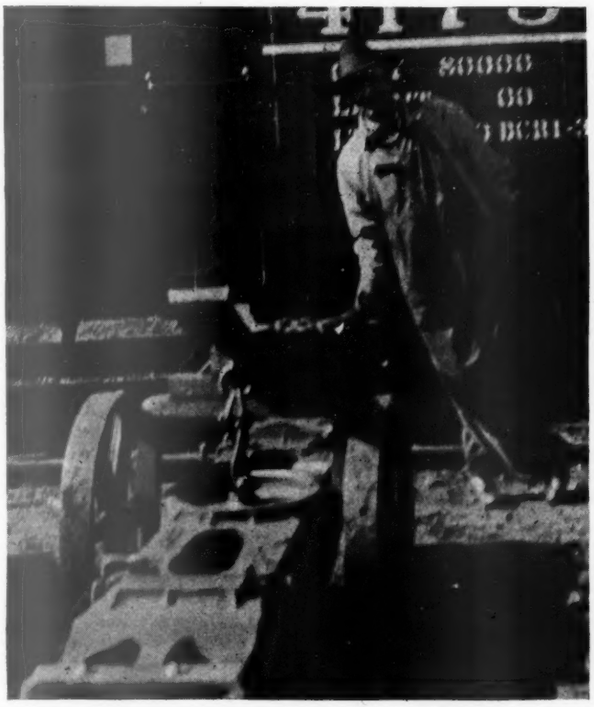
A Useful Truck for the Rip Track

THE illustrated two-wheel truck, equipped with 24-in. wheel, an arched axle and a 6-ft. tongue, is a device that is being used on the rip tracks of an eastern road for handling truck and body bolsters, side frames, couplers, axles and tail beams. The truck, with lifting tongs or grab irons suspended 2 in. behind the center of the axle, has a leverage ratio of 36 to 1, thus enabling an average man to load an 800-lb. truck bolster with ease after an assistant inserts the lifting tongs in the king-pin hole.

The extension bar or lip that is bolted on the top

The truck is designed with a leverage ratio of 36 to 1

of the tongue in front of the wheels enables two men to handle truck side frames without undue effort. The truck offers a safe and suitable means for removing and



The truck loaded with an 800-lb. bolster

replacing side frames and for removing bolsters from between truck wheels.

Jack-Handling Truck

A CONVENIENT two-wheel truck, used for handling heavy jacks in car-repair work at the Stony Island (Chicago) shops of the Nickel Plate, is shown in the illustrations. The truck consists of a built-up frame mounted on two wheels of about 18-in. diameter to permit easy movement over dirt roadways which may at times be somewhat rough and irregular, especially in many car repair yards.

An examination of the illustrations will indicate clearly the construction of the truck. The steel plate, which is bent and cut out to form a fork end for engaging the jack, is adjustable vertically for jacks of different heights by sliding in suitable ways in the main truck frame. The jack-supporting plate is grooved and notched at the center to receive the point of a holding trigger, or dog, which can be set in any one of five notches to give the desired height. In using the truck, the handle is simply

Convenient two-wheel jack-handling truck used at Stony Island (Chicago) shops of the Nickel Plate

elevated sufficiently to permit the truck jaws engaging the jack, the operation of pulling down the handle then lifting the jack, after which it can be readily moved to the next jacking position.

Another view of jack-handling truck, showing height-adjustment feature

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SHE JUST CAN'T QUIT because she'd be so lonely without "her boys." That was the statement of Mrs. Josie Rolla, only woman employed in the Union Pacific shops and the last survivor of wartime employment of women. "The boys in the shops treat me just like a mother," said Mrs. Rolla. "I couldn't work anywhere else." In 1918 when employment was open to women in all lines while the men were away at war, Mrs. Rolla started in the paint shop as a substitute. She worked there for some time, painting and refinishing fittings for cars. At first there were many other women working, but as the men came back the women left one by one. At last one of the seamstresses left and Mrs. Rolla was put in her place in the upholstery department. There she has stayed ever since. She has watched every woman employed in the shops leave until now she is alone. Mr. Rolla also works in the Union Pacific shops, in the hose room of the air brake department.

Instructing the Packer of Car Journal Boxes

THE Delaware & Hudson has set up in its oil and waste renovating plant at Oneonta, N. Y., a complete car journal and box for use in the instruction of

Device used on the Delaware & Hudson for instructing packers of journal boxes

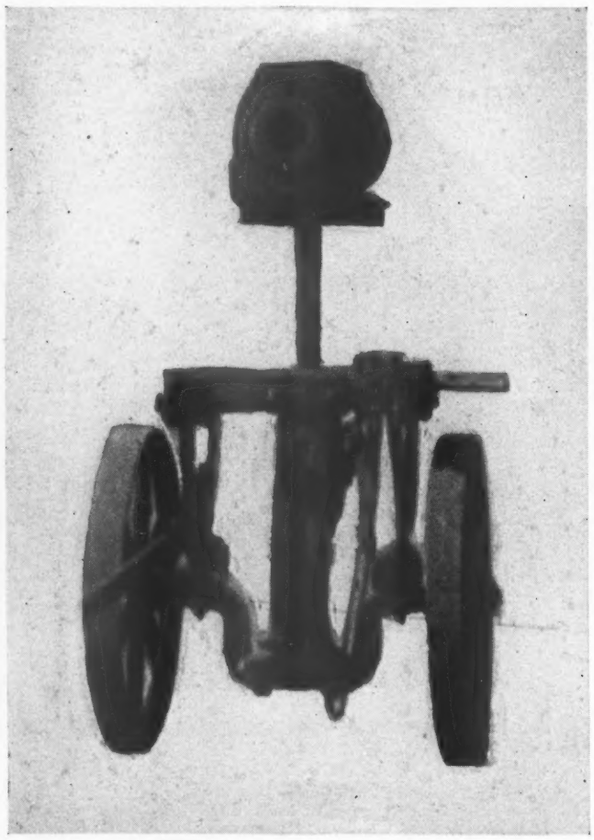
car men in properly packing boxes. The device consists essentially of a car journal which has been cut from the axle, a journal bearing, and a journal box which has been cut in two portions, as shown in the illustration. The upper half of the box is hinged to the lower portion so that the box can be opened for inspection. The journal bearing and journal box lid are secured to the upper portion. A handle welded to the side of the upper portion of the box facilitates opening and closing the device, which is mounted on a pedestal made from a scrap center sill and steel plates.

The car man packs the box in the usual manner. The device is then opened and the instructor and car man both have an opportunity to inspect the results of the work and to make necessary corrections.

Applying Draft Gears

IN the illustration is shown a cart that has been designed for conveying friction draft gears and for raising them into place in the coupler pocket. The table which holds the gear as it is being conveyed from the storage platform to the car on which it is to be installed, rests upon rigid brackets which are integral parts of the cart frame, no weight being supported by the ratchet jack which is set in these brackets directly beneath the table. The length and width of the table are the same as a standard gear and, it is gibbed at both ends with an off-set in the center for the insertion of the carrier iron. The stem or post of the jack is shouldered and fastened to the table.

When applying a friction gear it is only necessary to run the cart into position under the end of the car and jack the gear into place in the coupler pocket, in which



The cart with a draft gear in an elevated position as it would appear under a car

position the carrier iron is inserted under the gear, in the off-set in the table, and securely bolted in place. The jack is then lowered and the cart removed from under the car. This cart saves considerable in time and fatiguing labor in the performance of work of this nature.

* * *

One of the short lines not included in the consolidation—It carries passengers half a mile on 16-in. gage track. Compressed air supplies the motive power, the smoke from the stack being merely "atmosphere"

In the Back Shop and Enginehouse

Suggestions from Clearing

MOST of the work of maintaining and terminal conditioning of the 100 switching locomotives, operated by the Belt Railway Company of Chicago, is handled at the shop and enginehouse at Clearing (Chicago), Ill. Safety, cleanliness and order are three closely allied features strongly emphasized. In the enginehouse, for example, as shown in one of the illustrations, receptacles are provided for dirty waste, scrap paper, etc. Moreover, the tool drawers and bench vises are supported from the enginehouse columns and do not extend to the floor in such a way as to afford a hiding place for tools and other material.

The generally picked-up and clean condition of the floor is evident from the illustration. The floors are not only swept every day, but each Sunday they are flushed with hot water from the hot-water washout system, which removes dirt from the enginehouse floor and pit and also has a marked tendency to loosen and remove accumulations of oil or grease. In addition, the fact that the enginehouse force knows that the floor will be flushed each week provides another incentive for keeping tools and materials off the floor, as they will be picked up and turned in by the clean-up gang.

Safeguards are provided to prevent, so far as possible, any sort of personal accident. The guards over the New York Central water-type ash pit are clearly shown in one of the illustrations. The sectional hinged rack guards over the pit between adjacent tracks, together with the chains for supporting these guards in a horizontal position, are clearly illustrated. One objection to this type of guard, when used in northern climates, is that it becomes weighted with snow and ice during the winter season and can be lifted only with considerable difficulty when necessary to clean the pit. Moreover, when in the vertical position, these racks interfere more or less with movement of the locomotive crane bucket used in cleaning out the ashes. The Belt

Parts of the reverse-lever guard adaptable to several classes of locomotives

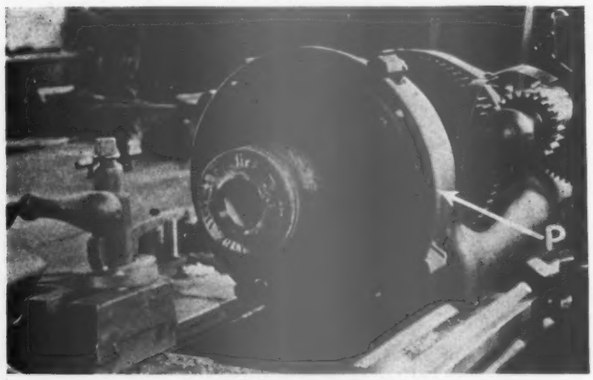
Railway is considering plans for eliminating this type of ash pit guard by extending the vertical rail sections high enough, when equipped with additional horizontal pipe rails, to prevent anyone coming out of a locomotive cab and accidentally falling into the pit. The type of tie rod and pipe ash pit guard for use between the rails is also well shown at the right of the illustration.

A piston-key keeper, which has been used for some time on the Belt Railway, is shown in another of the illustrations. This keeper consists of a forged lug, bolted to the crosshead, and with one end extending over the top of the crosshead key. This keeper, used

Effective ash-pit guards used at Clearing engine terminal

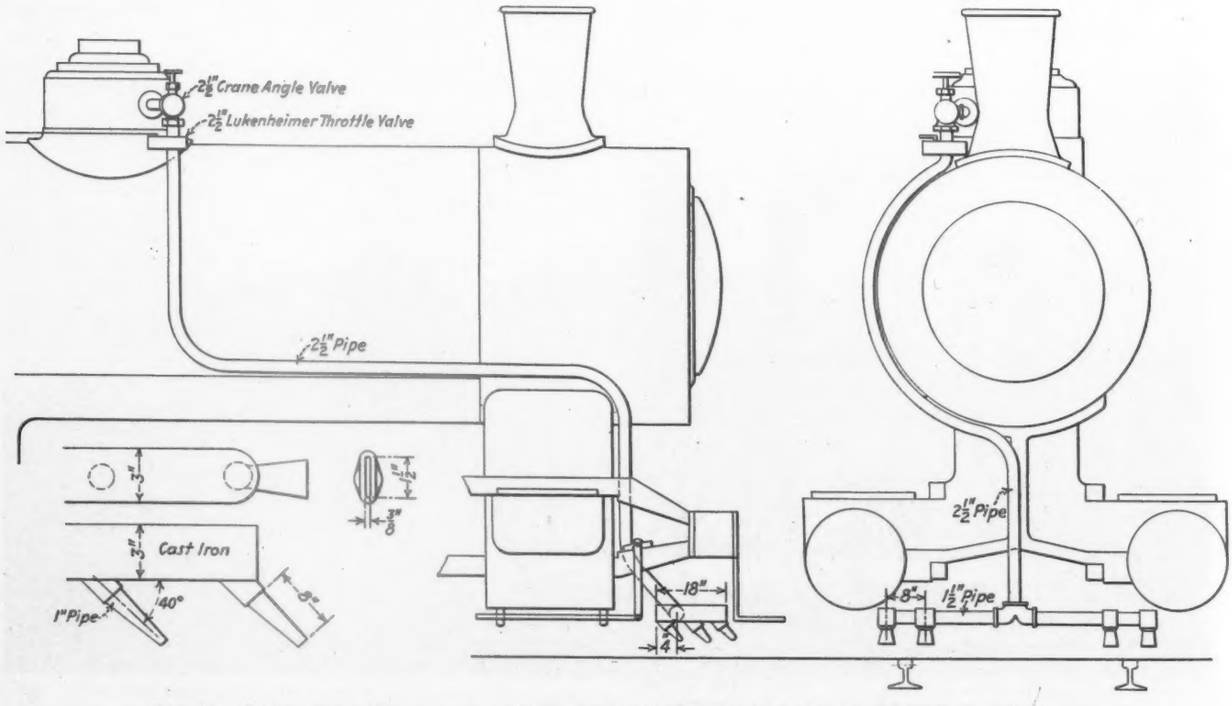
in addition to a cotter in the lower end of the key, is, of course, bolted on after application of the piston key in the crosshead. This type of keeper was developed only after experience in several instances showed that the cotters would shear off and the piston keys work out under the action of excessive stress, such as obtains when condensed water in the cylinders is not given sufficient chance to drain off through the relief valves.

The provision of some sort of a sliding guard where the reverse lever comes through the cab deck, in order to keep the slot covered and prevent the entrance of cold air under any position of the reverse lever, is essential. Various expedients have been tried in an attempt to overcome this difficulty, the most natural one being the provision of a sliding piece of sheet metal, slotted to receive the reverse lever, and moving in suitable ways. The objection to this method is that a plate long enough to cover the reverse-lever deck opening with the lever in the extreme forward position will extend too far back into the cab with the lever in the back-up position to be permissible in the limited space available in most locomotive cabs. The way this difficulty has been overcome on some roads, including the Pere Marquette and the Belt Railway, is illustrated. The guard consists of five pieces of 16-gage sheet steel, suitably slotted and resting one on top of the other about the reverse lever and arranged to slide in suitable Z-shaped metal runways, bolted to the cab deck at the reverse-lever opening. The method of slotting these plates for ready application to the reverse lever is illustrated. The slotted opening on one plate is covered by the uncut section of the next plate above and below it, thus making a close fit around the reverse lever.



A simple but effective device for reboring piston holes in non-pressure brake-cylinder heads central with the original bore

The method of operation of this guard will be apparent. No. 1 plate rests on top, with the other plates in order underneath, all being a snug sliding fit in the Z-shaped ways. The bottom plate, No. 5, has no movement in the ways and is slotted to permit full movement of the reverse lever. With the reverse lever in the extreme forward position, the plates occupy approximately the positions shown in the illustrations, as regards longitudinal position in the ways. When the reverse lever is pulled to the extreme back-up position, plate No. 4 moves approximately six inches until the end reaches an angle-iron stop, located at the end of the Z-shaped ways. Plate No. 3 has a slightly greater movement than No. 4, plate No. 2 moving still further and plate No. 1 moving with the reverse lever. It will be observed, therefore, that with this guard the reverse lever slot is at all times covered, without the guard plate striking the back boiler head or on the other hand extending back into the gangway. An interesting feature of this reverse-lever guard is that a single design was developed for application to 25 locomotives with somewhat varying reverse-lever and quadrant dimensions. By varying the height of the guard and enclosing it in a step box of the required height, the effective slot length of the guard could be made to equal the throw of the reverse lever at that elevation.



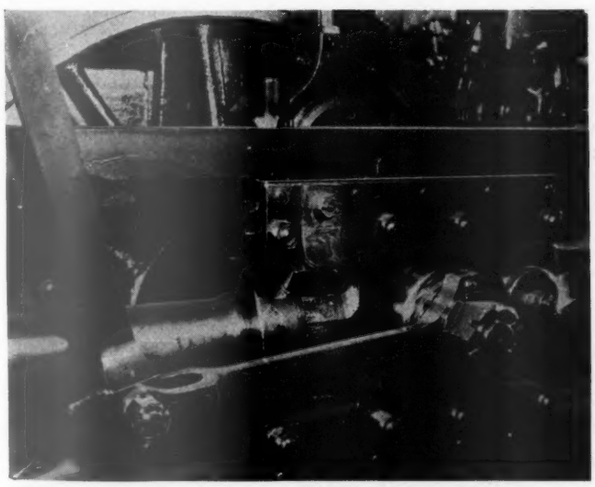
Details of the snow blower successfully developed and used on the Belt Railway of Chicago

An effective snow-blower for application to locomotives, used in clearing snow from terminal and yard tracks, is shown in the drawing. This blower, designed, but not patented, by E. F. Jones, master mechanic of the Belt Railway consists of two pairs of cast-iron manifolds, 18 in. long by 3 in. square, spaced 8 in. on centers and securely bracketed under the front bumper

Revolving ball-bearing table plate which greatly assists in circular welding operations

beam in such a way that one manifold is located 4 in. off center on each side of each rail. The two manifolds at each rail are connected by 1½-in. branch pipes and a tee to a 2½-in. supply pipe, installed without sharp bends and furnishing steam from an angle and a quick-opening throttle valve at the steam dome. The latter valve is capable of operation from the cab as experience showed the impracticability of any one being on or near the front end of the locomotive while the snow-blower is in operation.

These manifolds are each equipped with three 1-in. pipe nozzles, 8 in. long, flattened to the shape indicated in the drawing and projecting downward at an angle of



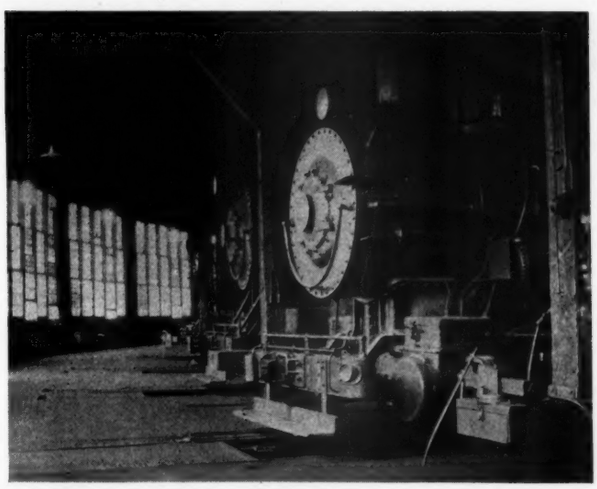
Piston key keeper which prevents any possibility of the key working out

40 deg. with the horizontal. The nozzle tips are designed to be about 4 in. above the tops of the rails. This location effectively clears the snow from the tops and both sides of the rails. In fact, the locomotive must be kept moving or the ballast, itself, will be disturbed.

This snow-blowing device is a heavy consumer of steam, but in spite of that fact is a valuable labor-saving device on account of the facility with which it cleans tracks of snow without the use of hand labor. With the throttle wide open, the locomotive can be operated at a speed of 10 miles an hour, thus permitting the tracks in a large terminal or yard to be cleared of snow in a relatively short period. With only one instead of three nozzles in each manifold, an operating speed of about 4 miles an hour is about the maximum for satisfactory clearing of the tracks.

In the Back Shop

When excessive lateral play develops in various parts of valve motion it is common practice to build up the worn places by welding, or brazing, the wearing surface then being machined to the original dimensions. It is not always easy to set up the valve-motion parts on the planer or shaper table in such a way that the finished surface will be square with the bore, and to reduce this set-up time and assure a more accurate job, the jig

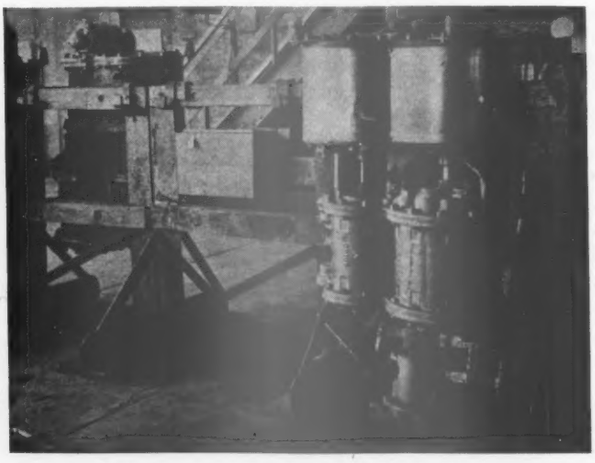


Interior of the Belt Railway enginehouse at Clearing, Ill.

shown in one of the illustrations has been developed. It consists simply of a rectangular steel frame capable of ready bolting to the shaper table, and having a pin *P* with adjustable expanding taper keys, giving the necessary range of diameters to suit motion pin holes. In operation, the valve-motion arm is placed on the pin *P* and the nut *N* turned to the right, which draws down a taper pin and expands the taper keys to fit tightly in the link-motion pin hole, thus accurately squaring the hole with the shaper table. Operation of the shaper then finishes the lateral to the required dimensions and assures a finished surface square with the pin hole. By loosening the nut *N* and setting up on bolt *H*, the taper pin can be readily backed out of pin *P*, permitting the taper keys to draw together and free the link-motion part.

A convenient method of reclaiming the worn non-pressure heads of brake cylinders is well shown in another illustration. When the piston holes in these heads become worn excessively large and off-center, they are built up by brazing and it then becomes necessary to rebore the hole accurately and to the original center. An auxiliary circular steel plate *P*, 1 in. thick

and machined with circular ring projections to correspond with brake cylinders of various sizes, is automatically centered when placed in the universal chuck. Bolting the non-pressure head to this plate assures its being properly centered with respect to the plate and, consequently, when the hole is bored, there is every assurance that it will be central with the original center line of the non-pressure head.



A substantial air-compressor rack built up of welded steel bars and shapes

One method of taking up lateral play on driving boxes at the Clearing shops consists of the application of steel plates of the required thickness by welding, as shown in one of the illustrations. On account of their weight, driving boxes are more or less awkward to move and, since frequent or, preferably, a continuous slow movement is required for the best results in welding, this distracts the welder's attention. The driving

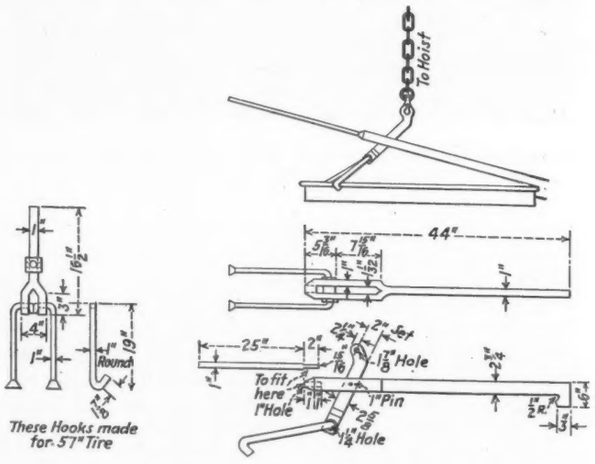
Jig used in machining the built-up lateral wear surfaces of valve-motion parts square with the bore

box, shown in the illustration, is mounted on a circular steel table plate which revolves on ball bearings, reclaimed from a worn-out jack and set in the floor. For the welding of all sorts of heavy, circular work, it is important that the welding be continuous and this ball bearing table greatly facilitates the operation while welding the box.

As in the enginehouse, particular attention is given in the back shop to maintaining a generally clean condition of the floor. While most of the air-brake repair work, including the overhauling of air compressors, is done in the balcony, space considerations have made it desirable to store air compressors temporarily on the main floor, both before and after overhauling. A substantial and well-braced steel rack is provided for this purpose. The rack is built up largely by welding steel angle uprights to horizontal floor pieces and bracing both ways with suitable pieces of bar iron. Heavy hooks, capable of adjustment along the upper horizontal bar to suit air compressors of different types, are provided.

Handling Tires on a Boring Mill

THE illustrated jig is one that has been designed to facilitate the handling of driving-wheel tires when placing them on the table of a boring mill prepara-



Jig to facilitate tire set-up on boring mill

tory to boring or returning flanges to standard contour. It consists of two pieces, one of which is 16½ in. long and equipped with two hooks of 1-in. round iron, the ends of which are bent to fit the wheel flange. The other piece of the jig is made of 1-in. round iron, 44 in. long, is machined at one end to fit the contour of the wheel flange and is fitted at the other end with a removable handle, 25 in. long. It is split to serve as a means for attaching the first piece which is held in position by a 1-in. pin.

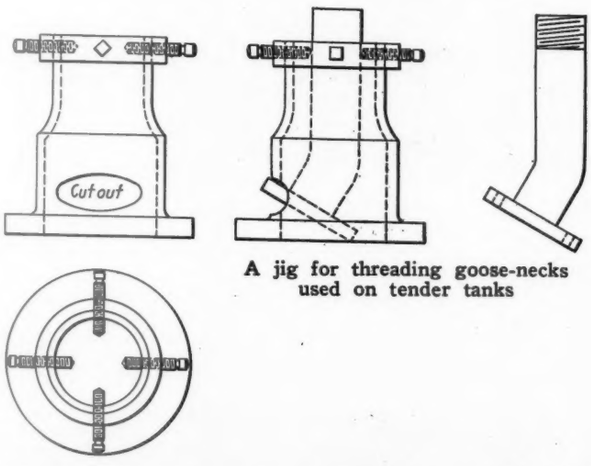
When placing a tire on the table of the boring mill, the hooks of the device fit the flange of the tire as shown in the drawing. While the tire is being lowered to the table the chain of the hoist will often strike the bridge before the tire is in position above the chuck jaws. When this occurs, the tire can be tilted by means of the handle and set against one of the chuck jaws which will cause the tire to fall into position in the other jaws when lowered to the table.

FIFTY YEARS AGO—The Eastern [now a part of the Boston & Maine] has adopted the practice of long locomotive runs for its line between Boston, Mass., and Portland, Me., 108 miles. Heretofore the line has been in two divisions, locomotives and crews being changed at Portsmouth, N. H., while now both locomotives and crews make the entire run.—Railway Age, April 8, 1880.

Jig for Threading Tank Goose-Necks

A COMMON water-tank goose-neck connection with a 30-deg. bend, which can neither be swung between centers of the lathe nor chucked, can easily be threaded by the aid of the jig shown in the drawing. The cast-iron pipe is placed in the jig and the end to be threaded is roughly centered by the four set screws. A hole in the side provides clearance for the projecting flange and the assembly is chucked in the lathe. If the end of the flange rests against the lathe chuck this will steady the goose neck and the opposite end, held securely by the four set screws, may be turned and threaded to suit.

This jig was made from a part of a Mallet low-pressure exhaust pipe which had an enlarged end to form a stuffing box for a slip-joint steam pipe used on some Mallets which have a rigid boiler and articulated frame.



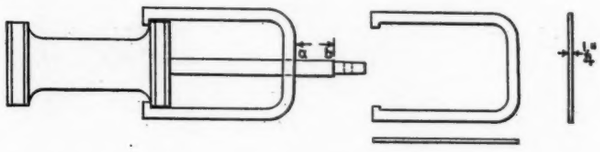
A jig for threading goose-necks used on tender tanks

The main portion of the jig is cast iron but the ring threaded for the set screws is made of steel and shrunk on. The jig is merely a supplementary chuck which allows irregular portions of the work to extend within it, as shown in the drawing.

Measuring Device for Valve Stems

SHOWN in the drawing is a convenient measuring tool or square for checking the length of valve stems after adding washers between the valve stem collar and valve proper to lengthen the stem, or facing off the valve stem collar to shorten the stem, when squaring valves. The tool checks the actual amount the stem is lengthened or shortened after the valve is reassembled and ready to be applied in the chamber.

In using the tool, a measurement is taken from one of the rings of the valve to the shoulder of the taper fit. The square fits around the back end of the valve and the hooked ends are brought to bear against the steam edge of the ring. The distance *ab* is measured with a machinist's scale or a light scratch is made with a scriber at *a*. The required change in the length of the stem is made and the square is reapplied to check the actual amount of change. The square will prove of special value to the valve setter for checking changes in valve-stem lengths that are made at the valve bench to his specifications. The use of the square makes it possible to set a new valve or stem to the exact length of the old one as the measurement is made from a fixed point on



A tool for checking valve-stem lengths when squaring locomotive valves

the valve body (the steam edge of the ring) to the shoulder of the stem which bears against the valve crosshead.

Straightening a Tender Frame

AN interesting piece of repair work recently completed in a railroad shop was the straightening of a cast-steel tender frame, the entire length of which had been bent in a wreck. The frame was set up with rods and I-beams, as shown in one of the illustrations, preparatory to straightening it. Eight heats of 1,600 deg. were required to straighten each middle section. A heat of 1,800 deg. was maintained at all times on the back center cross beam and the back end sill in order to allow this section to straighten out while the middle section was being pulled into place. Only seven feet of the front section was straight and this was securely anchored to an 18-in. I-beam which acted as a lever and

The frame set up with rods and I-beams preparatory to straightening it

straight edge in straightening the remainder of the frame. The position of this I-beam with respect to the frame is shown in the illustration.

The small furnaces used to heat the middle sections were made from scrap 16-in. auxiliary air tanks and lined with plastic Plibrico furnace lining. Oil burners

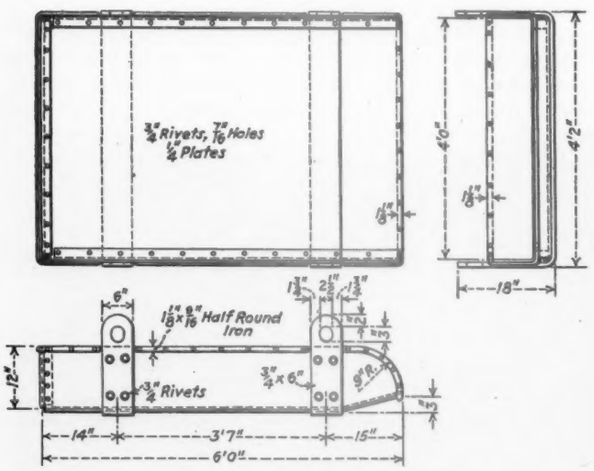
were installed in each furnace and oil was piped from the shop line. The straightening of this cast-steel frame

The straightened frame

by the aid of the special heating furnaces was completed at a repair cost of $274.59.

A Material-Handling Pan

THE pan shown in the drawing, designed to facilitate the handling of material, is constructed of ¼-in. plates and is 6 ft. long, 4 ft. 2 in. wide and 12 in. deep. The feature of the pan is the design of one



A pan for handling material

end which has the sides curved as shown and is bent upward at an angle of 30 deg. to serve as an aid in dumping the pan when loaded. The pan is braced by two ¾-in. by 6-in. brackets which are riveted to the sides and each of which has two 2½-in. by 3-in. oblong holes for attaching crane hooks. When loaded and ready to dump, the pan is lowered until it rests on the place where the material is to be deposited and the chain hooks removed from the two front brackets. The chain, still coupled to the pan at the two rear brackets, is then raised. The pan, with the slightly inclined edge, acts as a chute and is easily unloaded, there being no corners or angles where small or large pieces might lodge or be caught.

A Handy Lifter for Driving Springs

SETTING driving springs in place when the erecting operations are being performed is a disagreeable job. However, in an effort to overcome some of the difficulties that are usually encountered, the lifter shown in the illustrations was built at the Parsons, Kan., shops of the Missouri-Kansas-Texas.

This lifter is in the form of a yoke and is suspended from the hook of the shop crane. The upper end of the lifter is fitted with a connection for slipping over the

A spring on the lifter before being swung into position

crane hook. This connection is almost in the same vertical center line as the fork at the lower end in which the springs rest. The distance from the fork at the lower end to the vertical section of the lifter (the bottom of the "U"), is sufficient to permit the springs to be swung in to the proper position on the spring saddles

This shows how the lifter permits placing the spring on the saddle

and still clear all parts on the side of the locomotive; such as runboards, air compressors or drums.

TWENTY-FIVE YEARS AGO—An unusual departure in locomotive design is represented in a Pacific type locomotive that the Chicago, Milwaukee & St. Paul has recently completed at its Milwaukee (Wis.) shops, which has a narrow firebox with dimensions of 9 ft. 5⅛ in. by 41⅛ in. The Milwaukee has experienced great difficulty in obtaining a life of more than 18 months from the side sheets of the wide fireboxes and it is for this reason that the designers have returned to the narrow firebox.—*Railway Age*, March 17, 1905.

NEW DEVICES

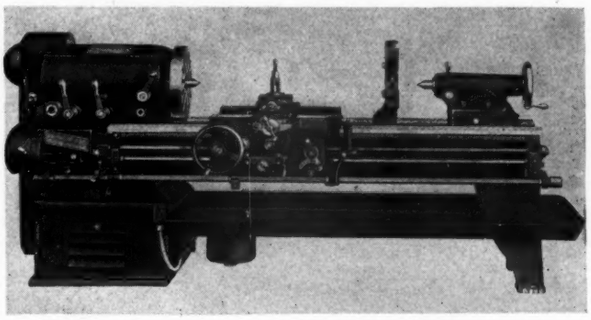
Reed-Prentice Lathes

IN the illustration is shown the 20-in. sliding-gear-head lathe recently placed on the market by the Reed-Prentice Corporation, Worcester, Mass. This machine, also made in the 16-in. size, has a bed width of 16½ in. and is available in 6-ft., 8-ft., 10-ft., 12-ft., and 14-ft. sizes. It is equipped with a sliding-gear transmission of nine gears which furnish eight spindle speeds in geometric progression from 12 to 405 r.p.m. The gears slide on multiple-spline shafts of heat-treated nickel chromium steel which run in radial ball bearings and are lubricated by running in a bath of oil. A disc clutch and brake are mounted within the main drive pulley for starting and stopping the head spindle.

The lathe is furnished with an enclosed-type quick-change gear box with gears of high-manganese alloy steel which provide 41 changes of feeds and thread cutting speeds. The feeds are from .0035 in. to .112 in. per revolution, while 3 to 96 threads can be cut per inch. The lead screw is 1-7/16 in. in diameter, has a four-pitch Acme thread and runs in radial ball bearings equipped with hardened steel and bronze washers for thrust. The lead screw and feed-rod construction are separate, the lead screw not rotating when the feed rod is in use, and vice versa. The cross-feed screw, 1 in. in diameter, also has a four-pitch Acme thread and is provided with a large-diameter micrometer collar that is graduated in thousandths of an inch.

The tailstock is of the three-bolt type with lateral adjustment for taper turning and has a 3-⅛-in. spindle with a hole for No. 5 Morse taper. The apron is a one-piece box casting of the double support type and is furnished with a central oil reservoir. One lever operates a double-disc clutch for either cross or longitudinal feeds. An interlocking device prevents engagement of feeds and threads at the same time.

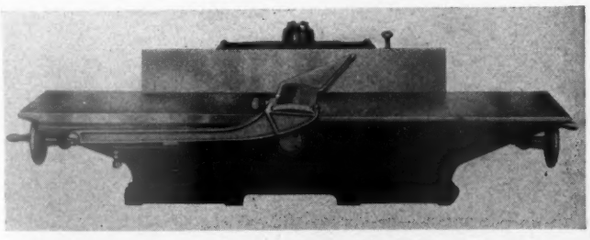
For heavy-duty work, the lathe is equipped with either a 5-hp., 1200 r.p.m. motor or a 7½-hp., 1800 r.p.m. motor. Standard equipment includes a single pulley drive, large and small face plates, compound rest and tool post, steady rest, thread chasing dial, centers and wrenches.



The Reed-Prentice 20-in. sliding-gear-head lathe

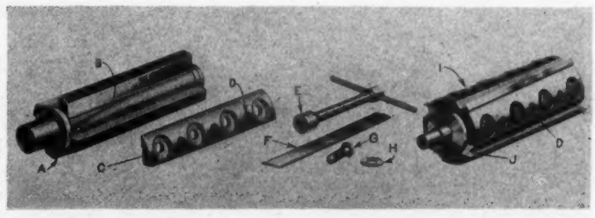
The Wallace Hand Jointer

A NEW 8-in jointer utilizing a skew-knife type of cutter head has recently been placed on the market by J. D. Wallace & Company, 134-158 S. California Ave., Chicago. One of the illustrations shows the die-cast Duralumin cutter head *A* mounted on a steel shaft. The knives lie on flat surfaces *B* and are clamped in position with the die-cast Duralumin cover plate *C* which receives the bolts *G* and washers *H*. The holes for these bolts are tapped into the steel shaft and the washers extend over the top surfaces of the knives. The four bolts provided for each knife are made of heat-treated alloy steel. They are screwed in with a hexagonal socket wrench *E* which is included with each machine. In this cutter head the skew angle is fixed so that one end of the knife leads the other end by approximately ½ in.



The No. 10 Wallace jointer

The cutter head is mounted on two Timken roller bearings to increase the load-carrying capacity and durability. An improved safety guard which is over the knives at all times during surfacing operations is also provided. The stock is pushed against a projecting horn under the guard which drops back to its original position

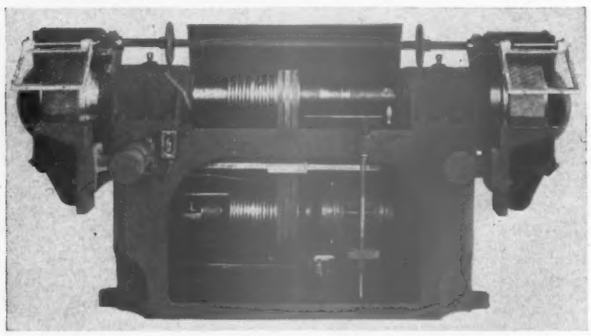


Detail parts of the skew-type cutter head as applied to the No. 10 Wallace jointer

against an adjustable stop after the cut. In surfacing it is not necessary to remove the hands from the stock, the cover plate of the guard being so narrow that the fingers can walk over it. With this design of cover plate, and since the guard is always over the knives, accidents are practically impossible.

The Standard High-Speed Grinder

THE Standard Electrical Tool Company, 1938 West Eighth street, Cincinnati, Ohio, has recently brought out a high-speed floor-stand grinder as an addition to its line and has designated it as the No. 50 grinder. The spindle of this machine, 4 in. in diameter and 74 in. long, is mounted in four S.K.F. ball bearings. The driving power is transmitted from a General Electric 40-deg. ball-bearing motor, mounted in the base, to the spindle by three Dayton V-cog belts. Drive sheaves on the motor drive shaft and on the spindle are designed to provide three spindle speeds, a feature which provides flexibility in operation.

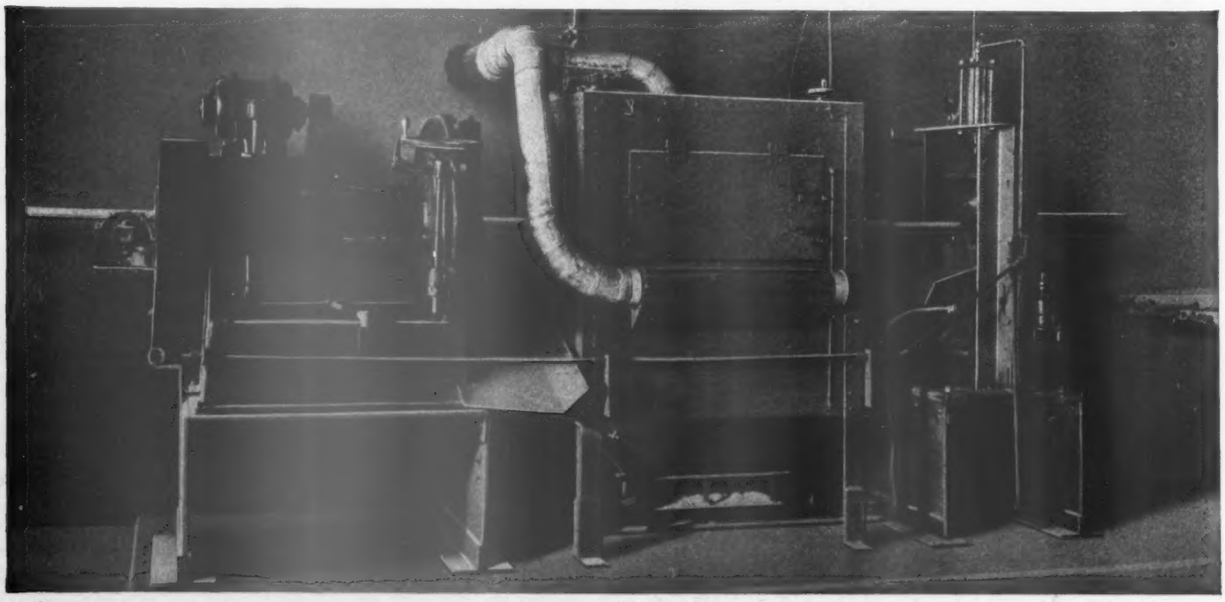


The Standard No. 50 grinder

The motor is raised and lowered by means of a lead screw for changing the speed of the belts and at the same time assuring proper belt tension. The grinder is equipped with movable work rests and boiler-plate hoods with overlapping covers to accommodate any working condition. A safety control device is furnished to work in conjunction with the movement of the hoods to guarantee against over speeding wheels and to assure a satisfactory working range of 7,500 to 9,000 s.f.p.m. The machine is equipped with ring-type grinding wheels, 24 in. to 30 in. in diameter, with a 12-in. hole for a 2-in. and 4-in. face. The 24-in. wheels are furnished with the machine when a 10-hp. motor is specified and 30-in. wheels when a 15-hp. motor is specified.

The Ryerson-New Haven Flue Cleaner

JOSEPH T. Ryerson & Son., Inc., Sixteenth and Rockwell street, Chicago, Ill., has recently developed for the market a sand-blast flue cleaning system. It consists of a scale-cracking unit, a sand-blasting cabinet, a flue puller, a dust arrestor and an exhauster and is capable of handling any size ranging from 1½ in. to 6 in., outside diameter. Only one flue can be put through the cleaner at one time, 2-in. flues being cleaned



The Ryerson-New Haven flue-cleaning system

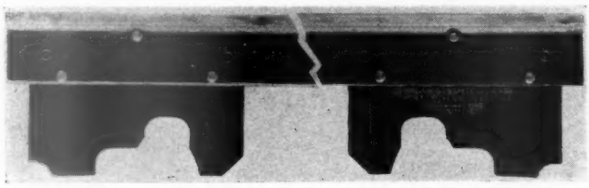
at the rate of one per minute, while the 6-in. superheater flues are cleaned at the rate of 20 per hour.

The cracking rolls of the scale-cracking unit have replaceable rims of a special steel, the teeth of which bear against the outside of the flue and crack the scale. They are mounted in such a way that they feed the flues into the sand blasting cabinet as the scale is removed. Guides which handle the complete range of flues from 1½ in. to 6 in. are adjusted by means of a large hand wheel.

As the flue leaves the cracking unit it automatically enters the sand-blasting cabinet. A battery of nozzles force the sand at high velocity against the flue while it is revolving, the sand dropping to the bottom of the cabinet from where it is returned to the sand-storage chamber by means of suction tubes. The dust in the cleaning cabinet is drawn off through a dust manifold and exhaust tube by means of a strong suction and is carried to the dust arrestor where it is caught and retained by means of cloth bags, the clean air being exhausted to the fan or out into the shop. The dust collected is removed through a trap door at the bottom of the cleaning cabinet. After the flue has been sand-blasted it is brought out by the revolving motion of the flue-puller and is then ready for inspection.

B. & S. Wheel Gages

THE gages illustrated are recent additions to the line of railway gages manufactured by Brown & Sharpe Manufacturing Company of Providence, R. I.



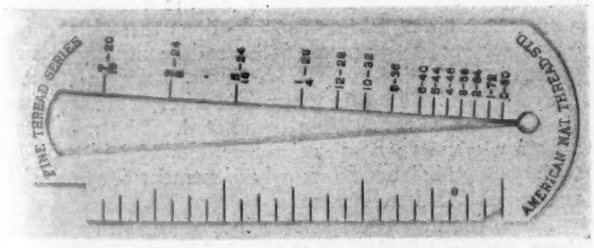
Gage No. 728C for checking the mounting of cast-iron and cast-steel wheels

Gage No. 728B for checking maximum flange thickness

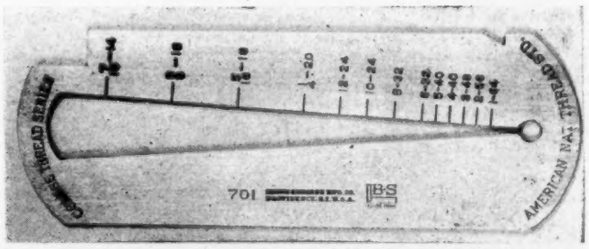
These gages, designated as Nos. 728B and 728C, are made to conform to A.R.A. standard and are for checking the maximum flange thickness on cast-iron wheels and for the mounting of wheels, respectively. These gages are made of tool steel, accurately machined and hardened. The mounting and check gage sections are held in correct positions by a T-section tie-bar which makes the tool rigid and permits it to be of light weight. These gages are checked against extremely accurate master gages for exact comformity to the standards of the American Railway Association.

The American National Standard Screw Gage

THE gages illustrated are recent additions to the Brown & Sharpe Manufacturing Company of Providence, R. I. as screw gage No. 701, to be used for determining screw threads according to American National and U. S. screw-thread standards. One side of the gage is graduated for the fine-thread series and the other side for the coarse-thread series. A 3-in. scale, graduated in eighths, is provided on the outer edge of one side for determining the length of the screws. Slots at each end of the scale permit the heads of both round- and flat-headed screws to be set against a positive stop while being measured.



The side of the gage to be used for the coarse-thread series



The side of the gage to be used for the fine-thread series

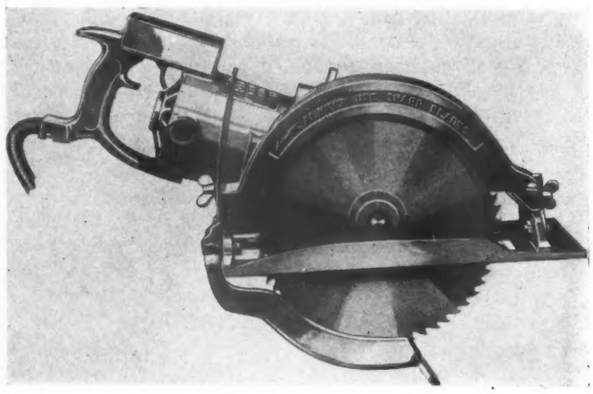
THE ST. LOUIS-SAN FRANCISCO, as the result of a steady campaign for the elimination of unsafe practices, and the education of its 30,000 employees in safety methods, reduced casualties among its employees 33 per cent during 1929, as compared with 1928. During 1929, 12 fatalities were reported and 3,430 employees were injured, a total reduction in injuries since 1923 of 48.4 per cent.

The Wodack Electric Hand Saw

THE DeWalt Products Corporation, Leola, Pa., has recently added the Wodack electric hand saw to its line of products. This saw is so designed that there is clear vision from the operator to the point of cut and it is equipped with a saw-dust blower which keeps the cutting line always visible. The saw is equipped with a blade mounted on a molded rubber bushing and with a gravity type of safety guard.

The blades revolve clockwise, causing the machine to hug the material. For bevel cutting the entire body of the motor tilts. The saw is furnished with a General Electric motor and is operated by a convenient trigger switch, which is located, as shown, at the top of the grip guard, convenient to the fore-finger.

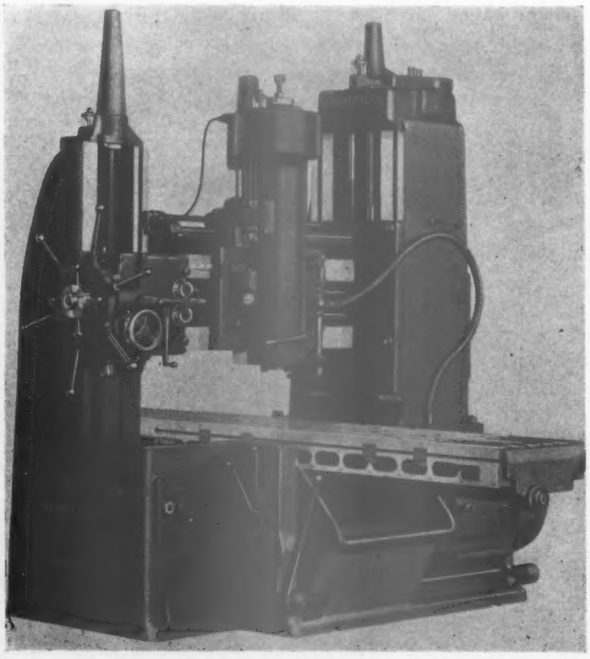
This saw is manufactured in four models: the Model *K*, weighing 15 lb. with a cutting capacity of 2⅝ in.; the Model *C* with a 4⅛-in. cutting capacity; the Model *B* with a 4⅛-in. cutting capacity and a 60-deg, beveling feature; and the Model *D* equipped with 1-hp. motor for handling 4½-in. material and with the 60-deg. beveling feature.



The Wodack electric hand saw

A Bridge-Type Vertical Miller

THE Kearney & Trecker Corporation, Milwaukee, Wis., is manufacturing a vertical milling machine designated as the bridge-type Mil-wakee-Mil. This machine has a table which is 22 in. wide and can be furnished with power feeds ranging from 2 ft. to 11 ft. The bridge-saddle and spindle movements are primarily controlled by two levers at the front of the bed, while a third lever starts and stops the spindle. The bridge is fitted into ways on an upright housing that is bolted solidly to the bed and has no adjustment. It is raised and lowered by means of two screws, one at each end, which are geared together to preserve alinement. It can be raised or lowered by power and securely locked in any desired position. Provision is made in the outer upright so that the nut of one screw can be accurately adjusted for precision leveling of the bridge. Safety trips are provided at both limits of travel.



The bridge-type Mil-waukee-mil

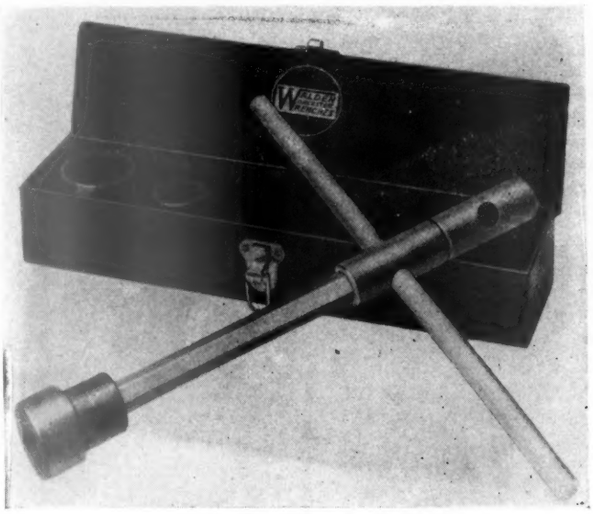
The saddle which carries the vertical spindle ram has a 27-in. horizontal travel along the bridge, either at feeding rate or power rapid traverse. To aid in setting up quickly, a scale, graduated in tenths of an inch, is set in the rail to show the approximate position of the saddle along the bridge. A horizontal selective lever at the front of the feed box on the outer end of the bridge engages the feed and power rapid traverse of the saddle and bridge. Two graduated dials with crank clutches adjacent to the selective lever are used for close hand adjustment of the saddle or the bridge.

The power feed for the saddle is driven from a standard feed box and is the same at all settings as the table feed so that the cutter mark on the work will always be the same whether the table feed or saddle cross-feed is engaged. It is possible to engage both the saddle cross-feed and the table feed at the same time for diagonal milling. There are trip dogs to stop the feed or power rapid traverse of the saddle at any desired point along the bridge. A horizontal lever in front of the ram locks the gib in the saddle after vertical adjustment of the ram has been completed. The ram has a power vertical feed in both directions and is provided with counter-balanced vertical adjustment for both slow and quick hand movement.

The bridge can be securely locked to both uprights. the saddle can be locked to the bridge, and a lock ha been provided for the table. Thus, during boring opera tions, the only movable part is the spindle and its driving mechanism. The saddle and the feed box carried on the bridge are all supplied with oil by a primary oil pump located in the bed of the machine.

Socket Wrenches for Washout Plugs

STEVENS Walden, Inc., 427 Shrewsbury street, Worcester, Mass., has developed a special set of socket wrenches for washout plugs which has been designated as the Walden-Worcester set No. 45. It consists of 1¼-in., 1½-in. and 2-in. heavy-duty, double-square sockets to fit all washout plugs in common use. The double-square feature is a double broaching of the sockets so that they will fit over the plug in eight positions instead of four, thus enabling the operator to obtain a new hold on the plug at every turn of 45 deg. instead of 90 deg.



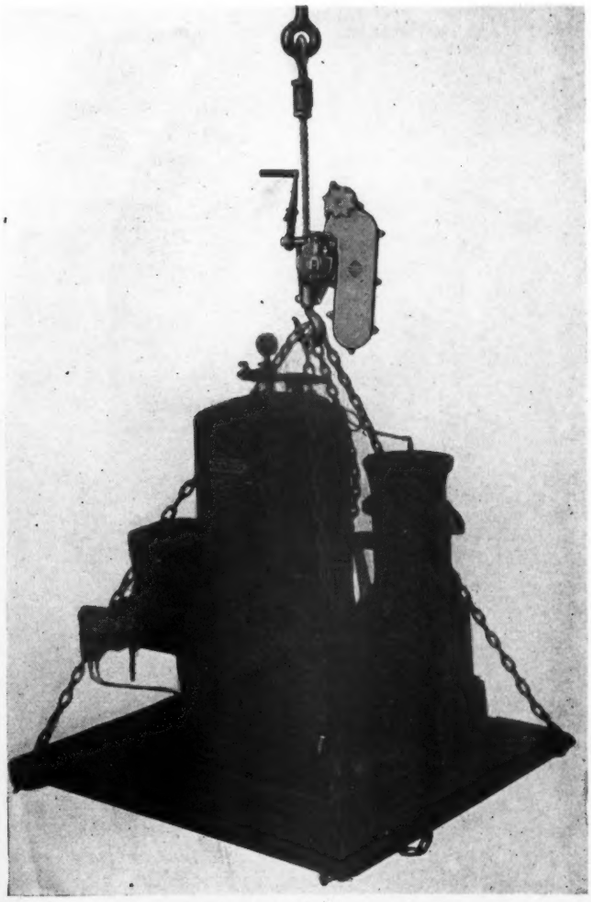
The No. 45 set of Walden-Worcester Socket Wrenches for washout plugs

The wrenches are designed to facilitate the removal of washout plugs

The handle combinations, designed with enough leverage to start any plug, permit the cross bar to be used at the socket as an offset wrench or at different distances from the socket in order to clear obstructions. The cross bar slides through a hole cross-drilled in the handle or in the socket, thus forming either a T- or an L-handle. The end of the shank or the adapter can be used as a solid handle with which the operator can hold the wrench while he pulls on the crossbar or takes a new hold on the plug. The sockets and the handles are made of heat-treated chrome-alloy steel, which enables the sockets to be made with a minimum thickness, thus giving maximum clearance around plugs.

The Matthews Pullift

THE W. N. Matthews Corporation, St. Louis, Mo., has patented and placed on the market a one-man hoist and puller to be known as the Matthews Pullift with a capacity of 5,000 lb. A hook or clevis is supplied on each end or with a hook on one end and a clevice on the other, both being interchangeable. A magazine is provided as a safe means of keeping the free end of



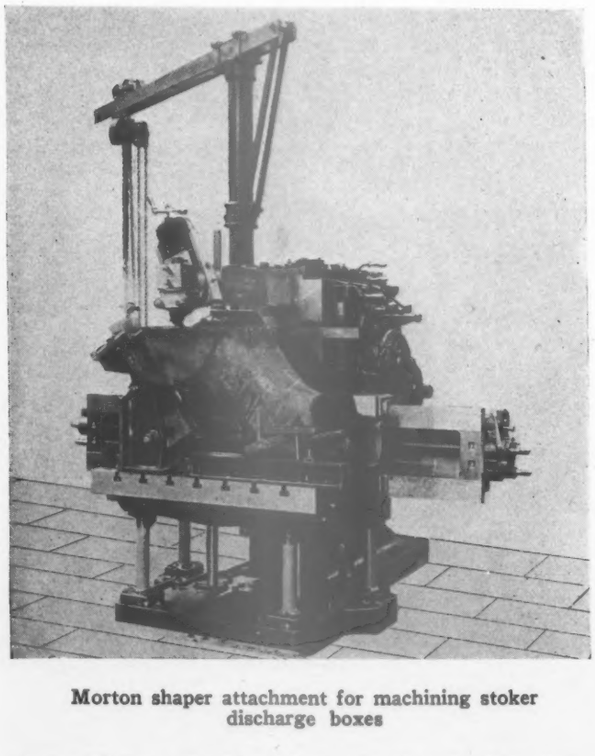
The Matthews Pullift with a suspended load

the chain from coming into contact with any obstruction in the vicinity of the job on which the puller is being used.

The Pullift has a standard take-up of 5 ft. when the magazine is not used but this is reduced to 4 ft. 7½ in. when the magazine is in use. In the event a longer lift is required the device can be supplied with any length of chain that is desired. Because of the worm and worm gear construction of the hoist the load is always carried by the tool and is not transmitted back to the operator through the ratchet handle. The device is capable of lifting 1,000 lb. at the rate of 16 ft. per minute, the ratchet handle permitting easy operation under heavy loads or in restricted places. The hoist is constructed of high-strength steels with heat-treated wearing parts and has a total weight of 33 lb.

Machining Stoker Discharge Boxes

THE Morton Manufacturing Company, Muskegon Heights, Mich., have recently placed on the market a 48-in. draw-cut shaper with a special tilting attachment used in the machining of locomotive stoker dis-

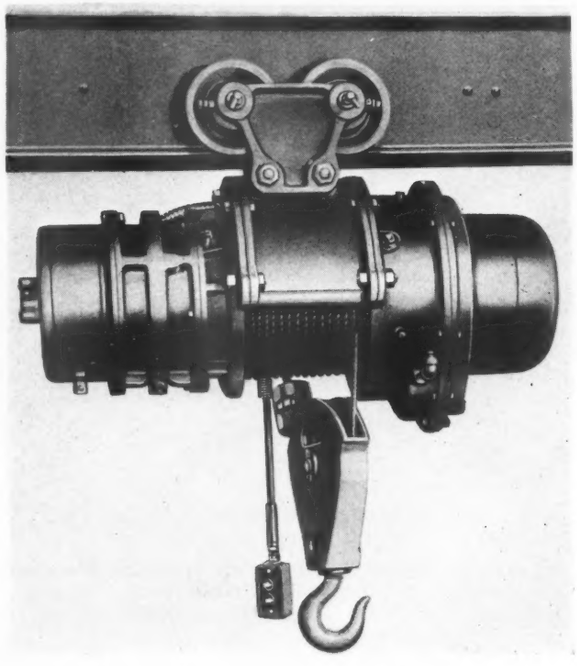


Morton shaper attachment for machining stoker discharge boxes

charge boxes, on which there are five shaping operations, all at different angles. This machine has a 60-in. horizontal or side feed, a 27-in. vertical feed, a distance of 41 in. between the ram and the lower table, and a power rapid traverse, both horizontal and vertical. It has four self-adjusting screws for raising and lowering the table to assure alignment of the work at all times. The machine is driven with a Morton variable-speed transmission having 20 or more speed changes.

Milwaukee Electric Hoist

A NEW line of the electric hoists with capacities ranging from ½ ton to 10 tons has recently been announced by the Milwaukee Electric Crane and Hoist Corporation, Milwaukee, Wis., a division of the Harnischfeger Corporation. The hoists are designed for high-speed operation and are especially adaptable for the handling of materials. They are equipped with forged



The Milwaukee electric hoist

heat-treated gears and pinions, forged-steel wheels, alloy-steel shafts which are ground to size and roller bearings throughout. Additional features are push-button control, single- or variable-speed control and an oil-bath lubrication for gears and brakes.

* * *

Wide World Photo

Replica of an early locomotive which was included in a procession of ancient and modern railroad rolling equipment during the Centennial Celebration of the Rainhill trials on the Liverpool & Manchester in England

Among the Clubs and Associations

AMERICAN RAILWAY ASSOCIATION.—The Chicago offices of the American Railway Association have been moved from 431 South Dearborn street to 59 East Van Buren street.

NEW ENGLAND RAILROAD CLUB.—The annual banquet and entertainment of the New England Railroad Club will be held on May 13 at 6:30 p.m. at the Copley-Plaza Hotel, Boston, Mass.

CINCINNATI RAILWAY CLUB.—The members of the Cincinnati Railway Club will hold a dinner party at the Winton shops of the Cincinnati Street Railway Company on May 13 at 6:30 p.m. A musical program will be furnished by the employees of the railway.

L. G. BENTLEY, chairman, announces that the annual meeting of the Safety Section of the American Railway Association will be held, not at Colorado Springs as stated in Circular 252, but at the Cosmopolitan Hotel, Denver, Colo., on Tuesday, Wednesday and Thursday, July 1, 2 and 3.

RAILWAY CLUB OF GREENVILLE.—F. R. Layng, assistant chief engineer of the Bessemer & Lake Erie, is chairman in charge of the meeting of the Railway Club of Greenville to be held on May 20 at 6:15 p.m. at the Zion's Reformed Church, Greenville, Pa. New officers will be installed at this meeting.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Lubrication and Rule 66 will be discussed by G. W. Ditmore, master car builder, Delaware & Hudson, before the meeting of the Car Foremen's Association of Chicago to be held on May 12 at 8 p.m., daylight saving time, at the Great Northern Hotel, Chicago.

THE ST. LOUIS RAILWAY CLUB has elected the following officers for the ensuing year: President, W. Y. Brown, superintendent of car service of the Terminal Railroad Association; first vice-president, W. E. Hicks, assistant to the manager of the department of personnel of the Missouri-Kansas-Texas; second vice-president, J. W. Rea, general superintendent of the Missouri Pacific; third vice-president, M. F. Longwill, chief engineer of the Wabash, and secretary-treasurer, B. W. Frauenthal, general traffic agent of the St. Louis Public Service Company (re-elected).

GENERAL FOREMEN'S ASSOCIATION.—The next annual convention of the International Railway General Foremen's Association will be held at Chicago September 16 to 19, inclusive. The speakers during the four-day meeting of the association will include: F. R. Mays, general superintendent of motive power, Illinois Central, Chicago; L. Richardson, chief mechanical officer, Boston & Maine, Boston, Mass.; J. A. Anderson, assistant superintendent of motive power, Chicago, Milwaukee, St. Paul & Pacific, Milwaukee, Wis., and H. C. Stevens, general storekeeper, Wabash, St. Louis, Mo. The subjects of committee reports to be presented at this convention include the following:

Engine-Truck Maintenance and Lubrication; Chairman, A. T. Streeper, general foreman, New York, Chicago & St. Louis, Conneaut, Ohio.

Cost of Material Delays to Locomotives and Cars; Chairman, F. M. A'Hearn, general foreman, Bessemer & Lake Erie, Greenville, Pa.

Stabilization of Mechanical Shop Forces; Chairman, F. L. Baker, general foreman, Chicago & North Western, New Butler, Wis.

Inspection, Maintenance and Repairs to Gas-Electric Rail Cars; Chairman, W. H. Longwell, general foreman, Baltimore & Ohio, Gassaway, W. Va.

The General Foreman's Contribution to Fuel Economy; Chairman, C. M. Hillman, shop superintendent, Minneapolis & St. Louis, Marshalltown, Iowa.

Better Maintenance of Passenger Car Equipment; Chairman, J. W. Gibbons, general car foreman, Atchison, Topeka & Santa Fe, Topeka, Kan.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—The Fiftieth Anniversary of the American Society of Mechanical Engineers was celebrated April 5 to 9, inclusive, in New York, Hoboken, N. J., and Washington, D. C. The leading scientific and engineering societies and educational institutions throughout the world were invited to send two delegates to the celebration. Similar invitations were also extended to the leading trade associations and trade schools of the United States.

The actual celebration of the A.S.M.E. began on April 5 in New York, where the delegates, members and guests took part in the unveiling of a tablet in the lobby of the Engineering Societies Building, commemorative of the anniversary. The party then adjourned to the offices of the American Machinist where a program was given depicting the preliminary organization meeting on February 16, 1880.

The anniversary program was continued at Stevens Institute of Technology, Hoboken, N. J., where a pageant depicting the progress in mechanical engineering was presented in the college assembly hall where the American Society of Mechanical Engineers was founded on April 7, 1880. This pageant of engineering progress was written by Dr. George Pierce Baker, Department of Drama, Yale University. A welcoming dinner was given at the Hotel Roosevelt in New York at 7:30 p.m. under the auspices of the Metropolitan section of the society. The toastmaster was Charles M. Schwab, an honorary member and past president of the society. The address of welcome was given by the president of the society, Charles M. Piez. Addresses were made by James H. McGraw, chairman of the board, McGraw-Hill Publishing Company, and Robert I. Rees, president of the Society for the Promotion of Engineering Education.

On Sunday morning at 11 o'clock commemorative services were held at the Cathedral of St. John the Divine, New York.

The program then continued to Washington on April 7, where the society convened at 11 o'clock in the National Council Chamber of the United States Chamber of Commerce building. The programs at Washington continued from 10 a.m. April 7 until Tuesday evening, when the Fiftieth Anniversary dinner was held in the Hotel Mayflower at 7 p.m. The last event on the program was a

* * *

Locomotive history on the Great Northern—On the left is the "William Crooks," the first locomotive operated in Minnesota

reception at the White House on Wednesday afternoon.

Fiftieth Anniversary medals were conferred upon 16 prominent engineers from as many foreign countries. The formal presentation of the medals was made in each case by the diplomatic representative in Washington of the country sending the delegate. This occasion was also utilized for the presentation of four other medals; namely, the A.S.M.E., the Gantt, the Melville, and the Guggenheim medals to William L. Emmet, Fred J. Miller, Joseph Roe and Orville Wright, respectively.

Dr. W. F. Durand, past president of the society presided as toastmaster at the formal dinner on Tuesday evening. Addresses were made by Charles Piez, Dr. Robert A. Millikan and the Honorable Ray Lyman Wilbur, Secretary of the Interior. This dinner also marked the first presentation of the Herbert Hoover medal which was presented to President Hoover.

Delegates to International Rail Congress Appointed

AT THE ELEVENTH INTERNATIONAL RAILWAY CONGRESS, which is to be held at Madrid, Spain, from May 5 to 15 inclusive, the United States will be represented by a committee of 10 industrial delegates headed by Colonel Edward A. Simmons, president of the Simmons-Boardman Publishing Corporation, while 9 North American railroads will send 20 representatives.

The industrial delegates, most of whom are connected with railway supply companies, appointed by the government of the United States, are:

CHAIRMAN—Simmons, Colonel Edward A., president, Simmons-Boardman Publishing Corp., New York.

Carr, George R., chairman, Locomotive Firebox Company, Chicago.

Merz, A. S., vice-president, Standard Railway Equipment Co., New York.

Muchnic, Charles H., consulting engineer, New York.

Plogstead, Walter J., General Railway Signal Co., New York.

Poor, Fred A., president, The P & M Company, Chicago.

Robinson, Bird M., president, The American Short Line Railroad Assn., Washington, D. C.

Schleiter, Walter F., president, Verona Tool Works, Pittsburgh, Pa.

Smith, Harold A., president, Transportation Publishing Co., Inc., Los Angeles, Cal.

Strong, James B., president, Ramapo Ajax Corporation, New York.

While it is possible that additional railroad delegates will be appointed within the next week or two, those railroad officers who have already signified their intention of attending the Congress from the United States and Canada are shown in the table.

Road	Representative	Position
Baltimore & Ohio	Voorhees, H. B.	Vice-Pres.
Canadian National	Gage, R. G.	Ch. Elec. Engr.
	Hills, A. J.	Asst. to Vice-Pres.
Delaware & Hudson	Burch, H. F.	Asst. Gen. Mgr.
Erie	von Schrenk, Dr. Herman	Consulting Timber Eng.
Illinois Central	Chisholm, W. H.	European Traffic Mgr.
New York Central	Wishart, W. C.	Vice-Pres. (Lines)
	Lentz, W. L.	Eng. Motive Power (Lines)
	Neubert, J. V.	Ch. Eng. Mt. of Way (R. R.)
	MacBain, D. R.	Gen. Mgr. Line West (R. R.)
Pennsylvania	Clement, M. W.	Vice-Pres.
	Le Boutillier, G.	Vice-Pres.
	Hankins, F. W.	Ch. Motive Power
	Ball, A. J.	Foreign Frt. Traffic Mgr.
	Allen, Porter	Ch. Engr. Mt. of Way
	Wiggins, W. D.	Ch. Engr., Central Region
Quebec Central	Coleman, D. C.	Vice-Pres.
	Brown, Sir George McLaren	European gen. mgr.
Reading	Ewing, Chas. H.	Vice-Pres.
	Hare, J. V.	Secy.

Club Papers

Air Brake Equipment

MANHATTAN AIR BRAKE CLUB.—Meeting held at 150 Broadway, New York, April 18, 1930. ¶The members of the Manhattan Air Brake Club discussed 10 topics pertaining to valves for air brake equipment and devices of new design with the object of familiarizing themselves with the operation and functions thereof. The object of this discussion was to afford those present the opportunity to secure information on the various devices before attending the convention of the Air Brake Association which is to be held in Chicago, May 13 to 16 inclusive. ¶The items covered in the discussion included the following: Canvas hood type brake cylinder protectors; 7⅝-in. cross compound air compressor which is a new compressor designed to be operated with superheated steam at relatively high pressures; variable release valves for auxiliary reservoirs, types A, AD and AF super-governors; H-6 and HS-2 pedestal type brake valves; hose couplings; super-steam valves; rotary type caboose valves and A.R.A. retaining valves.

Car Heating

Eastern Car Foreman's Association—Meeting held at the Engineering Societies building, 25 West Thirty-ninth street, New York, on March 28. Paper by W. H. Tucker, Vapor Car Heating Company, New York. ¶In the paper Mr. Tucker discussed diverse systems for heating cars and referred to tests which were run on the New York Central in 1927. He stated that these tests revealed that it was impossible to heat trains of 15 or more cars with 130 lb. steam train-line pressure when the cars and locomotive were equipped with 1½-in. connections which includes end train-line valves, hose and couplers. With 2-in. end valves, 2-in. insulated metallic joints and 2-in. couplers on all cars, engine and tender, he said, a train of 15 cars could be heated satisfactorily with a maximum pressure of 130 lb. ¶In discussing the development of thermostatic control that would automatically select desired temperatures for running and lay-over conditions, Mr. Tucker said that the use of this system is beneficial in any train service, but particularly in long trains for, when the temperature in the forward cars reaches 70 deg. or slightly higher, the solenoid vapor valves automatically close and this action causes steam to pass straight through the train line to the rear cars. He continued by saying that trainmen or porters need not be depended upon to open and close admission valves when thermostatic control is used because with that control all of the steam admission valves will automatically be in a closed position if the temperature in the cars is high enough to warrant this action. ¶In conclusion Mr. Tucker stated that the thermostatic-control vapor system automatically selects a 50 deg. temperature when there is no air in the brake pipe which results in the steam admission valves being open 15 per cent of the time with an outside temperature of 25 deg. above zero or higher, and 25 temperature of 15 deg. above zero or per cent of the time with an outside lower.

A. R. A. Rules

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Meeting held at the Great Northern hotel, Chicago, April 14. ¶At this meeting still further attention was given to the discussion of changes in the A. R. A. rules of interchange, several meetings having been devoted to this subject. F. J. Swanson, district master car builder of the Chicago, Milwaukee, St. Paul & Pacific and president of the Association, presided at the meeting and urged that car men co-operate more fully in an intelligent application of the rules, to the end that train operation may be improved and the public more effectively served. Mr. Swanson said: "With all due respect to our good car inspectors, we urge them to perform their work thoroughly in train yards and interchange yards by making closer inspection of equipment and properly classifying them by applying commodity-loading cards. Perfect equipment is a big benefactor. Stop train delays by bad order set-outs; stop transferring of bad order cars; give cars the best of attention by repairs and lubrication in order to meet the demands now necessary to a successful train operation and increase in car miles. We respectfully urge the fullest co-operation to make the different car-department operations a success."

The Hudson River Bridge

NEW YORK RAILROAD CLUB.—Meeting held at the Engineering Societies building, 25 West Thirty-Ninth street, New York, Friday, April 18, 1930. Papers by O. H. Ammann, chief engineer of bridges, the Port of New York Authority, and M. B. Case, engineer of construction, the Port of New York Authority. ¶The meeting opened with an impromptu address by Capt. Billings Wilson, deputy manager of the Port of New York Authority, in

which he described briefly the creation and purpose of the organization with which he is connected. Capt. Wilson told of the projects developed under the guidance and planning of the Port of New York Authority and what has been accomplished by that organization up to date. ¶Mr. Ammann's paper gave a brief account of the planning, financing and construction of interstate bridges by the Port of New York Authority with particular reference to the major engineering features of the Hudson River bridge and its approaches. This included an account of the building of the bridges across Arthur Kill, one connecting Staten Island and Perth Amboy, N. J., and one connecting Staten Island and Elizabeth, N. J. Mr. Ammann also gave an account of the engineering principles involved in the construction of the bridge across Kill Van Cull connecting Staten Island and Bayonne, N. J. The major part of the paper was given to the presentation of the engineering principles involved in the construction of the Hudson River bridge, the 3,500-ft. span of which compares with the 1,600-ft. span of the Brooklyn bridge across East River, New York and the 1,700-ft. span across the Delaware River connecting Camden, N. J., and Philadelphia, Pa. The paper also included a description of the anchorages that are set in solid rock, the bridge towers, the cables, the decks of the bridge and its approaches. Mr. Ammann stated that 7,000 tons of cable and 40,000 tons of steel will be used in the construction of this bridge.

In the second paper of the evening, Mr. Case gave an account of the major construction operations on the Hudson River bridge which included a description of the building of the coffer dams, the laying of the tower foundations, the erection of the towers, the setting of the anchorages and the manufacturing of the cables. Motion pictures of the construction of the bridge showing various stages of its development were then presented.

* * *

A Boston & Maine 2-10-2 type locomotive with 100 refrigerator cars at East Gardner, Mass.

Directory

The following list gives names of secretaries, dates of next or regular meetings and places of meeting of mechanical associations and railroad clubs.

AIR-BRAKE ASSOCIATION.—T. L. Burton, Room 5605 Grand Central Terminal building, New York. Next meeting, May 13 to 16, Hotel Stevens, Chicago.

AMERICAN RAILWAY ASSOCIATION.—DIVISION V.—MECHANICAL.—V. R. Hawthorne, 59 East Van Buren street, Chicago. Annual convention June 18-25, Atlantic City, N. J.

DIVISION V.—EQUIPMENT PAINTING SECTION.—V. R. Hawthorne, Chicago. Next meeting, Sept. 9-11, 1930, Congress Hotel, Chicago.

DIVISION VI.—PURCHASES AND STORES.—W. J. Farrell, 30 Vesey street, New York. Annual convention, June 18-20, 1930, Atlantic City, N. J.

DIVISION I.—SAFETY SECTION.—J. C. Caviston, 30 Vesey street, New York.

DIVISION VIII.—CAR SERVICE DIVISION.—C. A. Buch, Seventeenth and H streets, Washington, D. C.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. G. Macina, 11402 Calumet avenue, Chicago. Next meeting, September 10, 11 and 12, Hotel Sherman, Chicago.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. Thirty-ninth street, New York.

RAILROAD DIVISION.—Paul D. Mallay, chief engineer, transportation department, Johns-Manville Corporation, 292 Madison avenue, New York.

MACHINE SHOP PRACTICE DIVISION.—Carlos de Zafra, care of A. S. M. E., 29 West Thirty-ninth street, New York.

MATERIALS HANDLING DIVISION.—M. W. Potts, Alvey-Ferguson Company, 1440 Broadway, New York.

OIL AND GAS POWER DIVISION.—L. H. Morrison, associate editor, Power, 475 Tenth avenue, New York.

FUELS DIVISION.—A. D. Black, associate editor, Power, 475 Tenth avenue, New York.

AMERICAN SOCIETY FOR STEEL TREATING.—W. H. Eiseman, 7016 Euclid avenue, Cleveland, Ohio.

AMERICAN SOCIETY FOR TESTING MATERIALS.—C. L. Warwick, 1315 Spruce street, Philadelphia, Pa. Annual meeting Atlantic City, N. J., June 23-27.

AMERICAN WELDING SOCIETY.—Miss M. M. Kelly, 29 West Thirty-ninth street, New York.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Joseph A. Andrucetti, C. & N. W., Room 411, C. & N. W. Station, Chicago, Ill.

ASSOCIATION OF RAILWAY SUPPLY MEN.—J. W. Fogg, MacLean-Fogg Lock Nut Company, 2649 N. Kildar avenue, Chicago. Meets with International Railway General Foremen's Association.

BOILER MAKER'S SUPPLY MEN'S ASSOCIATION.—Frank C. Hasse, Oxweld Railroad Service Company, 230 N. Michigan avenue, Chicago. Meets with Master Boiler Makers' Association.

CANADIAN RAILWAY CLUB.—C. R. Crook, 129 Charon street, Montreal, Que. Regular meetings, second Tuesday in each month, except June, July and August, at Windsor Hotel, Montreal, Que.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—G. K. Oliver, 7836 So. Morgan street, Chicago, Ill. Regular meeting, second Monday in each month, except June, July and August. Great Northern Hotel, Chicago, Ill.

CAR FOREMEN'S CLUB OF LOS ANGELES.—J. W. Krause, 514 East Eighth street, Los Angeles, Cal. Meetings second Friday of each month in the Pacific Electric Club building, Los Angeles, Cal.

CAR FOREMEN'S ASSOCIATION OF ST. LOUIS.—F. G. Weigman, 720 North Twenty-third street, East St. Louis, Ill. Regular meeting, first Tuesday in each month, except June, July and August, at American Hotel Annex, St. Louis, Mo.

CENTRAL RAILWAY CLUB OF BUFFALO.—T. J. O'Donnell, 1004 Prudential building, Buffalo, N. Y. Regular meeting, second Thursday each month, except June, July and August, at Hotel Statler, Buffalo.

CINCINNATI RAILWAY CLUB.—D. R. Boyd, 3328 Beekman street, Cincinnati. Regular meeting second Tuesday, February, May, September and November.

CLEVELAND RAILWAY CLUB.—F. L. Frericks, 14416 Adler avenue, Cleveland, Ohio. Meeting first Monday each month, except July, August and September, at Hotel Hollenden, East Sixth and Superior avenue.

EASTERN CAR FOREMEN'S ASSOCIATION.—E. L. Brown, care of the Baltimore & Ohio, Staten Island, N. Y. Regular meetings fourth Friday of each month.

INTERNATIONAL RAILROAD MASTER BLACKSMITH'S ASSOCIATION.—W. J. Mayer, Michigan Central, 2347 Clark avenue, Detroit, Mich. Next meeting September 23-25, 1930, Hotel Sherman, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' SUPPLY MEN'S ASSOCIATION.—J. H. Jones, Crucible Steel Company of America, 650 Washington boulevard, Chicago.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. T. Winkless, Room 707, LaSalle Street Station, Chicago. Next meeting May 6-9, 1930, Hotel Sherman, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—William Hall, 1061 W. Wabasha street, Winona, Minn. Next meeting, September 16 to 19, inclusive, Hotel Sherman, Chicago.

INTERNATIONAL RAILWAY SUPPLY MEN'S ASSOCIATION.—L. R. Pyle, Locomotive Firebox Company, Chicago. Meets with International Railway Fuel Association.

LOUISIANA CAR DEPARTMENT ASSOCIATION.—L. Brownlee, 3212 Delachaise street, New Orleans, La. Meetings third Thursday in each month.

MASTER BOILERAKER'S ASSOCIATION.—A. F. Stiglmeier, secretary, 29 Parkwood street, Albany, N. Y. Annual meeting May 20-23, William Penn Hotel, Pittsburgh, Pa.

MASTER CAR BUILDERS' AND SUPERVISORS' ASSOCIATION.—A. S. Sternberg, master car builder, Belt Railway of Chicago. Next convention August 26-28, Book-Cadillac Hotel, Detroit.

NATIONAL SAFETY COUNCIL.—STEAM RAILROAD SECTION: W. A. Booth, Canadian National, Montreal, Que. Annual congress, September 29-October 4, William Penn and Fort Pitt Hotels, Pittsburgh, Pa.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic avenue, Boston, Mass. Regular meeting second Tuesday in each month, excepting June, July, August and September. Copley-Plaza Hotel, Boston.

NEW YORK RAILROAD CLUB.—Meetings third Friday in each month, except June, July and August, at 29 West Thirty-ninth street, New York. Douglas I. McKay, executive secretary, care of Standard Stoker Company, 350 Madison avenue, New York.

PACIFIC RAILWAY CLUB.—W. S. Wollner, P. O. Box 3275, San Francisco, Cal. Regular meetings, second Tuesday of each month in San Francisco and Oakland, Cal., alternately.

PUEBLO CAR MEN'S ASSOCIATION.—I. F. Wharton, chief clerk, Interchange Bureau, Pueblo, Colo.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 1124 Woodward building, Washington, D. C.

RAILWAY CAR MEN'S CLUB OF PEORIA AND PEKIN.—C. L. Roberts, chief clerk, Peoria & Pekin Union Railway, 217 Lydia avenue, Peoria, Ill.

RAILWAY CLUB OF GREENVILLE.—Paul A. Minnis, Bessemer & Lake Erie, Greenville, Pa. Meetings third Thursday of each month, except June, July and August.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 515 Grandview avenue, Pittsburgh, Pa. Regular meeting fourth Thursday in month, except June, July and August. Ft. Pitt Hotel, Pittsburgh, Pa.

RAILWAY EQUIPMENT MANUFACTURERS' ASSOCIATION.—F. W. Venton, Crane Company, 836 South Michigan avenue, Chicago. Meets with Traveling Engineers' Association.

RAILWAY FIRE PROTECTION ASSOCIATION.—R. R. Hackett, Baltimore & Ohio, Baltimore, Md. Next meeting October 21-23.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 1841 Oliver building, Pittsburgh, Pa. Meets with Mechanical Division and Purchases and Stores Division, American Railway Association.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, M. P. O. Drawer 24, St. Louis, Mo. Regular meetings, second Friday in each month, except June, July and August.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, P. O. Box 1205, Atlanta, Ga. Regular meetings third Thursday in January, March, May, June, September and November. Annual meeting third Thursday in November, Ansley Hotel, Atlanta, Ga.

SUPPLY MEN'S ASSOCIATION.—E. H. Hancock, treasurer, Louisville Varnish Company, Louisville, Ky. Meets with Equipment Painting Section, Mechanical Division, American Railway Association.

SUPPLY MEN'S ASSOCIATION.—Bradley S. Johnson, W. H. Miner, Inc., Chicago. Meets with Master Car Builders and Supervisors' Association.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, 1177 East Ninety-eight street, Cleveland, Ohio. Next meeting September 23-26, 1930, Hotel Sherman, Chicago.

WESTERN RAILWAY CLUB.—W. J. Dickinson, 343 South Dearborn street, Chicago. Regular meetings, third Monday in each month, except June, July and August.

NEWS

A GENERAL CONTRACT for the construction of a one-story shop building at the car repair shops of the Ann Arbor at Owosso, Mich., has been let to the Walsh Construction Company, Chicago, at a cost of about $50,000.

THE CANADIAN PACIFIC will construct a repair shop for handling steel ore cars at Nelson, B. C., also a number of shop buildings at Weston, Ont., and will make extensions to the enginehouses at Winnipeg, Man., and Fort William, Ont., to accommodate new passenger locomotives.

THE MISSOURI-KANSAS-TEXAS is planning to test 10 different types of locomotive whistles to determine the efficiency of the whistles in concentrating sounds ahead of the locomotive. The experiment will be made under the supervision of the superintendent of safety.

THE INTERSTATE COMMERCE COMMISSION'S preliminary statement of the number of railway employees as of the middle of the month of February shows a total of 1,544,971, a reduction of 3.82 per cent as compared with February, 1929, and of 3.94 per cent as compared with February, 1928.

THE NEW YORK, NEW HAVEN & HARTFORD has authorized the construction of additional tracks in the car storage yard at New Haven, Conn., at an estimated cost of $55,000, and the provision of improved coaling facilities at Waterbury, Conn., at a probable cost of $55,000. Work on these projects is to be done by company forces.

THE PITTSBURGH & LAKE ERIE has awarded a contract to the Roberts & Schaefer Company, Chicago, for the furnishing of an electric engine coaler and cinder-handling plant at Pittsburgh, Pa.

THE BALTIMORE & OHIO is laying additional side tracks and lengthening enginehouse stalls at different points on its 260-mile line from Fairmont, W. Va., to Lorain, Ohio. These projects are the final steps in a general improvement program, which involved the installation of five 115-ft. turntables to permit the operation of heavier motive power on the Fairmont-Lorain line.

THE NORFOLK & WESTERN contemplates the erection of a modern smith shop at its Roanoke, Va., shops. The new building will be of steel construction throughout, 637 ft., by 100 ft., with 64,000 sq. ft. of floor space. It is to be equipped with one 20-ton crane and two 10-ton cranes, each crane operating in one of the three spans into which the building is to be divided.

AT A MEETING of the board of directors of W. H. Miner, Inc., on April 19, A. T. Withall, manager of sales, was elected president of the corporation and G. A. Johnson, chief mechanical engineer, was elected senior vice-president. W. H. Miner, founder and for 30 years the head of the railway supply business which bears his name, made provision during his lifetime by which the officers and older members of the company would continue the business and participate in its earnings.

THE ERIE has awarded a contract to the Hecker-Moon Company, Cleveland, Ohio, for the construction of a two-stall enginehouse, several small yard buildings and the laying of a small amount of additional track at Akron, Ohio. A contract for a 2,000-ton capacity reinforced concrete coaling station at Susquehanna, Pa., has also been let to the Roberts & Schaefer Company, Chicago. The plant is designed to coal locomotives on four tracks and the facilities will include a sand plant with storage and drying facilities and two multiple track cinder-handling units.

Domestic Equipment Orders Reported During April, 1930

Locomotives

Name of Company	Number ordered	Type	Builder
Louisville & Nashville	6	4-8-2	Baldwin Loco. Wks.
Central of New Jersey	5	4-6-2	Baldwin Loco. Wks.
	5	Switching	Baldwin Loco. Wks.
Erie Railroad	10	Switching	Baldwin Loco. Wks.
Chicago, St. Paul, Minneapolis & Omaha	3	4-6-2	American Loco. Co.
Total for the Month of April	29		

Freight Cars

Name of Company	No. cars ordered	Type	Builder
Chicago, Milwaukee, St. Paul & Pacific	2	Air dump	Western Wheeled Scraper Co.
Freedom Oil Company	2	Tank	General American Tank Car Co.
Cities Service Tank Line	100	Tank	General American Tank Car Co.
Green Bay & Western	125	Box	Bettendorf Co.
Inland Lime & Stone Co.	14	Air dump	Koppel Industrial Car & Equipment Co.
Missouri-Kansas-Texas	100	Hopper ballast	General American Car Co.
Louisiana & Arkansas	300	Box	General American Car Co.
	200	Automobile	
New York, New Haven & Hartford	15	Coke	Standard Steel Car Company
Erie Railroad	25	Caboose	Magor Car Corp.
Oliver Iron Mining Co.	10	Air dump	Koppel Industrial Car & Equipment Co.
Northern Pacific	250	Stock	Ryan Car Co.
L.C.L. Corporation	100	Gondola	Standard Steel Car Co.
Union Pacific	300	Flat	Company shops
Total for the Month of April	1843		

Passenger Cars

Name of Company	Number ordered	Type	Builder
Reading	61	Multiple Unit	Bethlehem Steel Company
	7	Passenger and Baggage	Bethlehem Steel Company
	2	Passenger, Baggage and Mail	Bethlehem Steel Company
Total for the Month of April	70		

Baldwin Oil-Electric Switcher Tested

BALDWIN OIL-ELECTRIC switching locomotive, No. 61000, recently tested on the Illinois Central, has been transferred to the Chicago, Rock Island & Pacific where it will be operated in switching service at the La Salle Street station, Chicago, transfer service between Burr Oak, Ill., and Clearing station, and classification-yard service at Burr Oak. The locomotive, weighing 135 tons on two 4-wheel trucks, is powered with a 1,000-hp. Krupp Diesel engine, having six cylinders, 15 in. in diameter and with a 15-in. stroke. Electrical equipment for transmitting power to the truck wheels is furnished by the Westinghouse Electric & Manufacturing Co. The tests on the Rock Island will be comprehensive in character, with a full complement of recording instruments, meters and observers to develop readings and information necessary for a complete report of the performance of the locomotive.

National Safety Contest

THE NATIONAL SAFETY COUNCIL plaques awarded to the railroad having the best safety record in 1929 will be presented at a dinner to be given in Chicago on May 19. The contest, which was begun in 1926, culminates in the awarding of plaques once a year for the best record for safety of employees of Class I railroads on the basis of casualties to employees on duty per million man-hours (excluding employees in marine departments). For the purposes of the contest, the Class I railroads are divided into seven groups in accordance with their respective man-hour exposure, as follows (billions of man-hours):

Group A, 100 or more; Group B, 50-100; Group C, 20-50; Group D, 10-20; Group E, 5-10; Group F, 2-5; Group G, less than 2.

No railroad is eligible to win a group award more than twice in succession, for which reason the Union Pacific could not compete in 1928.

In 1928 the Southern received the award for Group A. with a casualty rate of eight per million man-hours; the Texas & New Orleans, that for Group B., with a rate of 8.91; the Oregon-Washington Railroad & Navigation Company, Group C., with a rate of 4.63; the Chicago Great Western, that for Group D., with a rate of 3.30; the Gulf, Mobile & Northern, that for Group E., with a rate of 3.15, and the Ann Arbor, that for Group F., with a rate of 2.81. Preliminary figures for 1929, based on the compilation of the quarterly figures, are of interest, although they cannot be considered as final. The preliminary statistics are as given in the accompanying table.

EMPLOYEE CASUALTIES, 1929; PRELIMINARY FIGURES

Rank	Railroad	Killed	Injured	Total Casualties	Man-Hours (000)	Casualties Per Million Man-Hours
Group A						
1	Union Pacific System	26	294	320	129,165	2.48
2	Central Region, Pennsylvania	46	946	992	128,443	7.72
3	Southern System	37	1,150	1,187	148,758	7.98
Group B						
1	Union Pacific Company	13	128	141	70,261	2.01
2	Atlantic Coast Line	10	419	429	58,122	7.38
3	Cleveland, Cincinnati, Chicago & St. Louis	19	468	487	55,763	8.73
Group C						
1	Oregon-Washington Railroad & Navigation	5	49	54	20,372	2.65
2	Oregon Short Line	6	54	60	22,126	2.71
3	Wabash System	19	356	375	49,382	7.59
Group D						
1	Los Angeles & Salt Lake	2	63	65	16,406	3.96
2	Chicago Great Western	4	75	79	18,903	4.18
3	Kansas City Southern	3	66	69	13,335	5.17
Group E						
1	Gulf, Mobile & Northern	2	8	10	5,952	1.68
2	Duluth, Missabe & Northern	3	18	21	5,897	3.56
3	Bessemer & Lake Erie	0	89	89	8,903	10.00
Group F						
1	Duluth & Iron Range	1	10	11	3,963	2.78
2	Staten Island Rapid Transit	0	12	12	3,683	3.26
3	Ann Arbor	4	21	25	4,445	5.62

Wage Statistics for January

THE NUMBER of employees reported by Class I railways to the Interstate Commerce Commission as of the middle of January was 1,561,035, and their total compensation for the month was $233,267,945. Compared with returns for the corresponding month of last year this shows a decrease of 33,709 employees, or 2.11 per cent, while the total compensation shows a decrease of $3,188,263, or 1.35 per cent.

D., T. & I. and Pennsylvania

THE PENNSYLVANIA and the Detroit, Toledo & Ironton have recently completed the consolidation of several facilities on the lines of the two roads. On March 1 the Pennsylvania enginehouse at Springfield, Ohio, was abandoned and locomotive service has since been performed at the D., T. & I. enginehouse. Detroit, Toledo & Ironton passenger trains began the use of the Fort Street station at Detroit, Mich., on March 10, enabling the road to enter the downtown section of Detroit, in place of the former terminus at Dearborn.

Story of Transportation Shown in Tableaux

AN EXHIBITION showing the history of transportation in America has recently been completed in New York by Messmore & Damon, creators of mechanical advertising displays. Arranged in ten tableaux, each designed to show an important step in the development of modern transportation, the complete exhibition required about one and one-half years of research and production work and cost about $150,000. Each of the individual tableaux occupies a space of from 6 ft. by 14 ft. to 7 ft. by 20 ft., but is so arranged on a framework of sectional tubing that the entire exhibit can be packed and moved on a single specially designed truck. Ground and water effects, borders and backgrounds are painted on rubberized cloth, while figures appearing in the scenes are carved from wood and are about one-third life size. Many of the various vehicles used are actual working models and all details of costume, scenery, harness, etc., are historically correct.

In chronological order, the subjects of the ten tableaux are as follows: The Indian drag; the Conestoga wagon; Fulton's steamboat "Clermont"; the famous race, on August 30, 1828, between the Baltimore & Ohio's first locomotive, the "Tom Thumb," and the gray mare; the Deadwood stage coach; the Pony Express; the coach used by Lincoln during his presidency; the race between the Mississippi river packets "Robert E. Lee" and "Natchez" from New Orleans to St. Louis; the first gasoline automobile, the invention of George B. Selden; and the first successful flight of the Wright brothers at Kitty Hawk, N. C.

The exhibition, which is said to be the only one of its kind ever prepared, is soon to be taken on a coast-to-coast tour.

Container Design Contest Announced

A COMMITTEE of several international organizations interested in freight transportation recently announced a prize contest for the development of freight container designs with a monetary award for the best container of five tons capacity, less its own weight, for interchange

Criterion Photo

The fourth tableau in Messmore & Damon's exhibition of the history of transportation shows the race, in 1828, between the Baltimore & Ohio locomotive "Tom Thumb" and the gray mare

among rail, highway and water carriers. The purpose of the competition, which is open to Americans, is to reduce costs of packing, storage and sorting and to promote rapid and economical transport.

The committee directing the contest was recruited from among the International Chamber of Commerce, League of Nations Advisory and Technical Committee on Communications and Transit, International Railway Union, Bureau Permanent International des Constructeurs d' Automobiles, International Association of Recognized Automobile Clubs, Conseil du Tourisme International, Federation Internationale des Transports Commerciaux Automobiles, Bureau International de Normalization de l'Automobile. Eligible entrants are: Firms manufacturing railway or motor equipment, transportation companies, organizations of the foregoing, schools and institutes and public institutions dealing with freight transportation. Subscriptions of $5,000 and $2,000 respectively toward the prize fund are reported from the Royal Automobile Club of Italy and the International Railway Union; other contributions are expected.

A recent circular of the Railway Business Association outlines the general plan of the contest and the conditions of competition. Containers entered are to be of two models, open and closed; for each model three different-sized containers must be submitted. Each container, however, must be so designed as to be able to carry five tons, less its own weight; each must also be interchangeable among railway, highway and marine carriers.

The jury will take into account: The lightest weight; the lowest cost of manufacture taking into account royalties to be paid; the lowest maintenance charges and greatest length of life; the easiest, most rapid and cheapest handling features; the least trouble in fastening container to its carrier and the best method of closing.

The competition will be in two parts. Designs, specifications, etc., will be due September 10, 1930; they are to be submitted to the International Chamber of Commerce. The second part of the competition will require entrants to submit such models for test as the jury may require. Details of the competition may be obtained from the International Container Competition Committee, International Chamber of Commerce, 38 Cours Albert Ier, Paris, or from P. H. Middletown, Railway Business Association, Packard Building, Philadelphia, Pa.

Fire Prevention

NEWS LETTER No. 38, which has been issued by the Railway Fire Protection Association, R. R. Hackett, secretary, Baltimore, Md., contains minutes of the meetings of the Southern Section in Atlanta, Ga., on February 19, and of the Eastern Section in New York on January 19. Other interesting data in the pamphlet include notes on a derailment of a freight train which was burnt up by gasoline, and fire in a gas-electric rail passenger car.

Supply Trade Notes

EDWIN N. HAZLETT has joined the sales engineering department of the Copperweld Steel Company, Glassport, Pa.

THE RAMAPO FOUNDRY & WHEEL WORKS has moved its New York City office from 29 Broadway to 9 Park Place.

THE TEXAS COMPANY has moved its offices from 17 Battery Place to 135 East Forty-second street, New York City.

C. E. GRAHAM has moved his office from 51 East Forty-second street to 370 Lexington avenue, New York.

LESLIE C. WHITNEY has joined the mill organization of the Copperweld Steel Company, Glassport, Pa., as chief metallurgist.

THE CUT-OFF & SPEED RECORDER CORPORATION, 230 Park avenue, New York City, recently changed its name to the Valve Pilot Corporation.

THE CHICAGO PNEUMATIC TOOL COMPANY, New York, has opened a branch office in the Merchants & Manufacturers building, Houston, Tex.

R. H. MCGREDY has been appointed representative of the Harnischfeger Sales Corporation, Milwaukee, Wis., with headquarters at 50 Church street, New York.

THE NAYLOR PIPE COMPANY, Chicago, has moved its New York City office from 25 Church street to 3116 Chrysler building, Lexington avenue and Forty-second street.

THE WROUGHT IRON COMPANY OF AMERICA, Lebanon, Pa., has made an agreement with the Lloyd Forge Company, Annville, Pa., to sell the latter's output of Lloyd's patent turnbuckles.

THE READING CHAIN & BLOCK CORPORATION, Reading, Pa., has appointed R. G. Elliott, 631 Chapel street, New Haven, Conn., to handle its entire line in the State of Connecticut.

THE CORBIN SUPPLY COMPANY, Macon, Ga., has been appointed representative for the complete line of chain and transmission equipment of the Chain Belt Company, Milwaukee, Wis.

EDWARD C. KENYON has been appointed a representative of the Ashton Valve Company, Boston, Mass. Mr. Kenyon has been assigned to duties in the railroad department with headquarters at the Chicago office.

MORLEY S. SLOMAN, representative of the Sullivan Machinery Company, with headquarters at Pittsburgh, Pa., has been promoted to manager of the Huntington, W. Va., branch office to succeed John S. Walker, Jr., who has retired to engage in banking in Huntington.

DANIEL B. MCCARTHY, sales agent of the American Car & Foundry Company, with headquarters at St. Louis, has resigned to become vice-president of the Quaker City Tank Line, Inc., with the same headquarters.

THE HENNESSY LUBRICATOR COMPANY, 136 Liberty street, New York, is the new name under which the business formerly conducted by J. J. Hennessy is being carried on. The company has opened an office at 20 East Jackson boulevard, Chicago.

THE LINCOLN ELECTRIC COMPANY, Cleveland, Ohio, has opened three new offices as follows: J. D. Luter is in charge of a new office at 338 Barnard street, Saginaw, Mich.; D. H. Carver is in charge at 225 E. Columbia street, Ft. Wayne, Ind., and E. D. Anderson is in charge at Oil City, Pa.

W. B. KOCHENDERFER, formerly in charge of engineering and sales for the Lake Erie Engineering Corporation, Buffalo, N. Y., has been appointed chief engineer of the hydraulic machinery department of R. D. Wood & Co., Philadelphia, Pa.

THE REED AIR FILTER COMPANY, INC., the Midwest Manufacturing Company, Inc., and the National Air Filter Company, Inc., the latter formerly a holding company for the three concerns have been consolidated under the name of the American Air Filter Company, Inc., with headquarters at Louisville, Ky.

T. M. REES has been appointed manager of the Pittsburgh district of Manning, Maxwell & Moore, Inc., in charge of sales of Putnam machine tools and Shaw electric cranes. In this capacity Mr. Rees will assist the Pittsburgh representative of Manning, Maxwell & Moore, the Arch Machinery Company, and also direct the sales of men assigned to this territory.

SAMUEL S. DEMAREST has become associated with the Detroit Graphite Company, Detroit, Mich., as manager railway sales in the East, with headquarters in the Chrysler building, New York. Mr. Demarest was formerly eastern railway sales representative of Pratt & Lambert, Inc., Buffalo, N. Y., and later vice-president and general manager of the Charles R. Long, Jr. Company, Louisville, Ky.

WILFRED SYKES, assistant general superintendent of the Indiana Harbor works of the Inland Steel Company, has been appointed assistant to the president of the Inland Steel Company in charge of operations, with headquarters at Chicago, to succeed David P. Thompson, deceased. James H. Walsh, general superintendent of the Indiana Harbor works has been promoted to works manager of that plant. Henry R. DeHoll succeeds Mr. Walsh as general superin-

tendent and Frederick M. Gillies succeeds Mr. Sykes as assistant general superintendent.

L. A. GERBER, former western district sales manager of the United States Chain & Forging Company, Pittsburgh, Pa., has been promoted to general sales manager; W. L. Reilly, for many years a member of the headquarters staff, has been promoted to assistant general sales manager; L. K. Robinson, former head of New England sales activities, has been promoted to eastern district manager with headquarters at New York and Harley Morris, former salesman in the western division has been promoted to western district manager with headquarters at Chicago.

THE BRADLEY WASHFOUNTAIN COMPANY, Milwaukee, Wis., has appointed five new representatives as follows: Raymond C. Grant, with headquarters at Helena, Mont., has been given the entire state of Montana, as well as certain northern counties in the state of Wyoming; Robert J. Shank has established sales offices in Omaha, Neb., and Des Moines, Iowa, and has taken over the entire states of Iowa and Nebraska; R. W. Andrews, who maintains an office in Rochester, N. Y., serves the surrounding territory; Frederick J. Ludwick, 216 East Washington street, Syracuse, N. Y., is the newly-appointed representative for the city of Syracuse, as well as the surrounding territory, and the Rocky Mountain Architects & Builders Service, California building, Denver, Colo., will represent the Bradley Company in the state of Colorado and certain counties in southern Wyoming.

THE AMERICAN ROLLING MILL COMPANY, Middletown, Ohio, has enlarged its executive staff by creating the offices of chairman of the board and vice-chairman, in addition to the existing positions. George M. Verity, president of the company since 1900, was elected chairman, and Joseph H. Frantz, first vice-president for the past 16 years, was elected vice-chairman. Both will remain in active relationship for consultation and general direction of the company's policies. Charles R. Hook, vice-president and general manager for the past seven years, was elected president, to succeed Mr. Verity. Mr. Hook will retain the duties of general manager. Other appointments include Calvin Verity, who has been treasurer and assistant general manager, elected vice-president and assistant general manager; S. R. Rectanus, assistant to Calvin Verity, elected vice-president in charge of operations; C. W. Davis, assistant treasurer, elected treasurer, and E. N. Millan, chief of construction, appointed chief engineer of the company.

F. H. LOVELL & Co., Arlington, N. J., and the Dressel Railway Lamp & Signal Company of the same city have been merged under the new corporate name of the Lovell-Dressel Company, Inc., with general offices and plant at Arlington. As a result of this merger there will be embodied under one management the manufacture of a specialized lighting equipment used in practically every branch of transportation. F. Hallett Lovell, since 1913 president of F. H. Lovell & Co., is chairman of the board of the new organization. Mr. Lovell was a member of the original firm of F. H. Lovell & Co., before it was incorporated in 1903 and was also president of the Lovell-McConnell Manufacturing Company. A. D. Hobbie, president of the Dressel Railway Lamp & Signal Company and vice-president and general manager of F. H. Lovell & Co., is president of the new company. Mr. Hobbie has been actively engaged in the manufacture of lighting equipment and its branches for a number of years. F. W. Dressel, vice-president of the Dressel Railway Lamp & Signal Company, is vice-president of the Lovell-Dressel Company. Mr. Dressel has had many years' experience as a lighting expert in signal and maintenance of way work. J. C. Wylie, vice-president of the Dressel Railway Lamp & Signal Company, and secretary of F. H. Lovell & Co., is vice-president of the Lovell-Dressel Company. Mr. Wylie in addition to his railroad experience is known in the marine field, having formerly been in the Navy Department at Washington. R. C. Schatzman, secretary of the Dressel Railway Lamp & Signal Company and in charge of the auditing and accounting departments, is secretary and treasurer of the Lovell-Dressel Company.

Obituary

ELWIN R. HYDE, president of the Bridgeport Safety Emery Wheel Company, Inc., died on March 25.

AUGUSTUS H. BULLARD, secretary and treasurer of the Bullard Company, Bridgeport, Conn., died on April 5.

EUGENE MAXWELL MOORE, vice-president and director of Manning, Maxwell & Moore, Inc., died on March 27 at the age of thirty-nine.

ROBERT J. DAVIDSON, treasurer of the Ramapo Ajax Corporation, New York, died on April 3 at his winter home, Daytona Beach, Fla.

GEORGE F. DAVIE, vice-president and treasurer of the Interstate Iron & Steel Company, Chicago, died in that city on April 8 following an operation.

MORRIS B. BREWSTER, president and general manager of Morris B. Brewster, Inc., Chicago, distributor of metallic packing, died in that city on April 14.

D. P. THOMPSON, assistant to the president in charge of operations of the Inland Steel Company, Chicago, died at Miami Beach, Fla., on March 24 from pneumonia.

OLIVER B. BARROWS, representative of the American Steel & Wire Company, with headquarters at St. Louis, Mo., died in that city on February 25, following a heart attack.

WILLIAM H. MINER, president of W. H. Miner, Inc., Chicago, died of heart failure on April 3 at Plattsburgh, N. Y., where he had undergone an operation for the removal of his tonsils.

Mr. Miner was born on October 22, 1862, at Juneau, Wis. Following the death of his father and mother when he was five years old, he lived with an aunt and uncle in Chazy. At the age of 16 years he entered the employ of the Wabash in the car shops at Lafayette, Ind. A short time later he became a machinist apprentice in an industrial shop in Minneapolis, Minn., later returning to the Wabash at Lafayette. In 1888 and 1889 he was superintendent of

William H. Miner

the Lafayette Car Works at Lafayette and the Lima Car Works at Lima, Ohio. After a period of service with the Michigan Central, he became master car builder for the California Fruit Transportation Company in 1893. During the time that he was with the California Fruit Transportation Company he conceived his idea for a device that would eliminate the extensive damage that was done to cars during movement and in 1894 received his first order for the Miner Tandem draft rigging. He then concentrated on the development of his draft gear and its sale tnrough his Chicago office and in 1905 established the first physical laboratory to be devoted to draft gear research, wherein he perfected his device as it is known today.

While engaged in this business he still remembered his boyhood environment and purchased an old home and ground on which he was raised in order to further farming in the community. On this land which gradually grew to embrace 13,000 acres, he specialized in the raising of pure bred stock and fowl and in scientific soil cultivation. In 1916 he built the Chazy Rural school where 500 children are educated annually in the common grades, high school and special courses in industrial and household arts, library, drawing, music and physical training. Another of his enterprises was the Physicians hospital, which he established at Plattsburgh, N. Y., in 1910 and which he rebuilt in 1926.

Personal Mention

General

J. A. NASH, superintendent of motive power of the Illinois Central, with headquarters at Chicago, has resigned and the position has been abolished.

L. ROBINSON, shop engineer of the Illinois Central at Chicago, has been promoted to assistant to the superintendent of motive power, with headquartes in the same city.

E. A. MURPHY has been appointed power supervisor of the Missouri-Kansas-Texas lines, with headquarters at Dallas, Tex., succeeding S. H. Barnes, deceased.

E. R. BATTLEY has been appointed assistant general superintendent of the motive power and car department of the Canadian National, with headquarters at Toronto, Ont.

JOHN R. SEXTON, who has retired as mechanical superintendent of the Northern district of the Western lines of the Atchison, Topeka & Santa Fe, with headquarters at La Junta, Colo., has been in railway service for 49 years. He was

John R. Sexton

born at Iowa City, Iowa, on April 5, 1863, and gained his first railroad experience at the age of 15 years as a machinist apprentice on the Chicago, Burlington & Quincy at Plattsmouth, Neb. After completing his apprenticeship he was employed for two years as a machinist on several roads, returning to the Burlington in the same capacity in 1885. Later he was advanced to gang foreman and to division foreman and in 1901 and 1902 served on the Great Northern at Devils Lake, N.D. In the latter year he was appointed general shop foreman of the Union Pacific at Cheyenne, Wyo., then being appointed general foreman on the Santa Fe at Cleburne, Tex. Mr. Sexton was promoted to master mechanic at Fort Madison, Iowa, in 1910 and to mechanical superintendent at La Junta on June 1, 1912.

M. F. BROWN, road foreman of engines on the Rocky Mountain division of the Northern Pacific at Garrison, Mont., has been promoted to the position of general fuel supervisor, succeeding M. A. Daly.

J. W. SURLES, superintendent of shops on the St. Louis-San Francisco at field, Mo., has been promoted to the position of assistant superintendent of motive power, with headquarters at the same point, succeeding Pierre O. Wood, deceased.

J. H. MCALPINE, superintendent of motive power of the Canadian National at North Bay, Ont., will succeed E. R. Battley as superintendent of motive power in the Montreal district.

Car Department

C. C. REDMOND, a freight car repairer in the employ of the Southern at Birmingham, Ala., has been promoted to the position of assistant foreman freight car repairs.

Master Mechanics and Road Foremen

J. W. JACKSON, locomotive foreman of the Canadian Pacific at Lethbridge, Alta., has been promoted to the position of master mechanic of the Edmonton division at Edmonton, Alta., succeeding J. W. Keppel.

M. A. DALY, general fuel supervisor of the Northern Pacific at St. Paul, Minn., has been appointed master mechanic of the Pasco division at Pasco, Wash., succeeding G. L. Ernstrom.

J. A. MARSHALL, master mechanic of the Yellowstone division of the Northern Pacific at Glendive, Mont., has been transferred to the Idaho division, with headquarters at Parkwater, Wash. Mr. Marshall succeeds R. P. Blake.

W. D. GOCHENOUR, master mechanic of the Rocky Mountain division of the Northern Pacific at Missoula, Mont., has been transferred to the Yellowstone division, with headquarters at Glendive, Mont., where he succeeds J. A. Marshall.

J. W. KEPPEL, master mechanic of the Edmonton division of the Canadian Pacific at Edmonton, Alta., has been transferred to the Brandon division, with headquarters at Brandon, Man. Mr. Keppel succeeds D. D. Cossar.

G. L. ERNSTROM, master mechanic of the Pasco division of the Northern Pacific at Pasco, Wash., has been transferred to the Rocky Mountain division with headquarters at Missoula, Mont., succeeding W. D. Gochenour.

W. P. BICKLEY, assistant master mechanic of the Pennsylvania at Altoona, Pa., has been promoted to the position of master mechanic of the Buffalo division, with headquarters at Olean, N. Y.

R. P. BLAKE, master mechanic of the Idaho division of the Northern Pacific at Parkwater, Wash., has been transferred to the Tacoma division, with headquarters at Tacoma, Wash., succeeding Charles Emerson, deceased.

D. D. COSSAR, master mechanic of the Brandon division of the Canadian Pacific at Brandon, Man., has been transferred to the Revelstoke division, with headquarters at Revelstoke, B. C., replacing M. W. Boucher, who was killed in a snow slide on February 19.

Shops and Enginehouse

L. M. FUQUA, general foreman of the Southern at Monroe, Va., has been transferred to a similar position at Richmond, Va.

A. C. Reeves, general foreman at the West shop of the St. Louis-San Francisco at Springfield, Mo., has been promoted to superintendent of that shop.

CARY S. FISHER has been appointed day enginehouse foreman of the Pittsburgh & West Virginian, with headquarters at Rook, Pa., succeeding D. A. Cassiday.

M. H. ARMS has been appointed night enginehouse foreman of the Oregon-Washington Railroad & Navigation Company, with headquarters at Rieth, Ore.

L. L. REED, a machinist in the employ of the Southern at Charleston, S. C., has been promoted to the position of night enginehouse foreman, succeeding B. Koch.

C. P. LIESFELD has been appointed machine shop foreman of the Southern, with headquarters at Richmond, Va., succeeding S. G. Jeffreys, deceased.

W. M. OWENS has been appointed night enginehouse foreman of the Oregon-Washington Railroad & Navigation Company, with headquarters at Huntington, Ore.

B. KOCH, night enginehouse foreman of the Southern at Charleston, S. C., has been promoted to the position of day enginehouse foreman, succeeding P. R. Robertson.

JOHN S. BURKE, a machinist in the employ of the Southern at Alexandria, Va., has been promoted to the position of machine shop foreman, succeeding J. G. Julian.

J. G. JULIAN, machine shop foreman of the Southern, has been promoted to the position of night enginehouse foreman, with headquarters at Alexandria, Va., succeeding J. C. Lindsay.

D. A. Cassiday, day enginehouse foreman of the Pittsburgh & West Virginian at Rook, Pa., has been promoted to the position of general foreman, with headquarters at Rook.

J. W. ANDERSON, assistant superintendent of motive power and machinery of the Chicago & North Western at Chicago, has been appointed master mechanic at Winona, to replace O. Protz.

W. B. WARREN, a machinist in the employ of the Southern at Appalachia, Va., has been promoted to the position of night enginehouse foreman, with headquarters at Bristol, Va., succeeding F. L. Anderson.

J. C. LINDSAY, night enginehouse foreman of the Southern at Alexandria, Va., has been promoted to the position of general enginehouse foreman, succeeding J. M. Householder.

F. L. ANDERSON, night enginehouse foreman of the Southern at Bristol, Va., has been promoted to the position of day enginehouse foreman, succeeding J. A. Tevis, deceased.

JOHN M. HOUSEHOLDER, JR., general enginehouse foreman of the Southern at Alexandria, Va., has been promoted to the position of general foreman, with headquarters at Monroe, Va., succeeding L. M. Fuqua.

P. R. ROBERTSON, day enginehouse foreman of the Southern at Charleston, S. C., has been promoted to the position of general foreman, with headquarters at Rock Hill, S. C., succeeding J. W. White who has resigned because of ill health.

C. M. DARDEN, assistant superintendent of machinery of the Nashville, Chattanooga & St. Louis at Nashville, Tenn., has been appointed superintendent of machinery, with headquarters at the same place, succeeding J. J. Sullivan who has retired.

ARTHUR CHAPMAN REEVES, who has been appointed shop superintendent of the St. Louis-San Francisco, with headquarters at Springfield, Mo., was born in 1879 at Toronto, Canada. He received a high school education and served an apprenticeship in the Polson Iron Works, Toronto. In 1909 he entered the shops of the Canadian Pacific at Winnipeg and was subsequently in the employ of the Canadian Northern, Northern Pacific at Brainerd, Minn., the Atchison, Topeka & Santa Fe, the St. Louis Southwestern, the Missouri Pacific and the DeQueen & Eastern. In 1909 he became a machinist in the West shops of the St. Louis-San Francisco at Springfield, and after serving as a gang foreman and an erecting foreman, he was appointed general foreman in 1926. He became shop superintendent on March 1 of this year.

Purchases and Stores

A. E. OWEN has been appointed assistant purchasing agent of the Pennsylvania, with headquarters at Philadelphia, Pa.

CHARLES WILLIAMS has been appointed district storekeeper of the Missouri Pacific, with headquarters at St. Louis, succeeding M. E. Bailie.

A. J. STOCKER has been appointed storekeeper of the Tucson division of the Southern Pacific, with headquarters at Tucson, Ariz.

M. E. BAILIE, district storekeeper of the Missouri Pacific at St. Louis, Mo., has been appointed assistant supply agent, with headquarters at the same point.

W. N. KUHN, assistant purchasing agent of the Pennsylvania, has been appointed assistant fuel purchasing agent, with headquarters at Philadelphia, Pa.

GEORGE H. SCHULTZ, assistant fuel purchasing agent of the Pennsylvania at Philadelphia, Pa., will succeed A. E. Owen as assistant purchasing agent at Chicago.

N. FEIGEL, district storekeeper of the Southern Pacific Lines in Texas and Louisiana, with headquarters at Algiers, La., has been transferred to Houston, Tex., succeeding W. E. Rawson.

W. J. KELLEHER, division storekeeper on the Illinois Central at New Orleans, La., retired under the pension rules of the company on March 31, after 33 years of service with that road.

J. J. JIROUSEK has been appointed storekeeper of the Chicago, Burlington & Quincy with headquarters at Grand Crossing, Wis., succeeding J. R. Hunter, who has been assigned to other duties.

THE JURISDICTION of C. B. Sauls, division storekeeper of the Illinois Central at McComb, Miss., has been extended to include all material heretofore handled by the New Orleans (La.) storehouse, following the abolishment of the position of division storekeeper at the latter point.

Obituary

MIGUEL CASTILLO, assistant to the superintendent of machinery and motive power of the National Railways of Mexico, with headquarters at Monterrey, N. L. Mexico, died on March 15.

HENRY LARUE, formerly master car builder of the Chicago, Rock Island & Pacific, died in Glendale, Cal., on February 28. From 1914 until he retired in 1924 Mr. LaRue had served as senior inspector of equipment of the Bureau of Valuation of the Interstate Commerce Commission. While master car builder of the Rock Island, he served as president of the Western Railway Club and president of the Car Foremen's Association, and in 1910 was a member of the arbitration committee of the Master Car Builders' Association.

CHARLES EMERSON, master mechanic on the Northern Pacific at Tacoma, Wash., died on March 22. He had been in the service of that road for 46 years.

G. L. ERNSTROM, master mechanic of the Pasco division of the Northern Pacific at Pasco, Wash., has been transferred to the Rocky Mountain division with headquarters at Missoula, Mont., succeeding W. D. Gochenour.

F. A. CHASE, who was appointed general mechanical inspector of the Chicago, Burlington & Quincy, Lines East of the Missouri River, in 1904, passed away at his home in Los Angeles, Cal., on March 29 at the age of ninety-five. Mr. Chase was born on August 18, 1836, in Monroe, Ashtabula County, Ohio. His parents moved to Windsor, Vt., in 1838, and in March, 1849, he became a train boy in the employ of the Sullivan railroad in New Hampshire. He became a machinist apprentice in 1850, and in November, 1854, went to Charleston, S. C., as a machinist in the shops of the South Carolina railroad. From 1855 until January, 1857, he was successively in the employ of the Georgia State Railroad and the Detroit Locomotive Works,

Frank A. Chase

Detroit, Mich. He was subsequently employed in the shops of the following roads: The Lake Shore & Michigan Southern at Leaporte, Ind., and Adrian, Mich.; the New Albany & Salem, now the Monon Route, at Michigan City, Ind.; the Marietta & Cincinnati as enginhouse foreman at Chillicothe, Ohio, and the Chicago, Burlington & Quincy at Aurora, Ill. He served as a fireman and as an engineman on the latter road from May, 1868, until May, 1878, when he was promoted to the position of enginehouse foreman at Aurora, Ill. He was appointed master mechanic of the Kansas City, St. Joseph & Council Bluffs, with headquarters at St. Joseph, Mo., in November, 1880, and in March, 1891, was given also jurisdiction of the West division of the Hannibal & St. Joseph. On March 1, 1896, he was appointed general master mechanic of the Hannibal & St. Joseph; the St. Louis, Keokuk & Northwestern; the Kansas City, St. Joseph & Council Bluffs; the Chicago, Burlington & Kansas City, and, later, the Keokuk & Western. He became general mechanical inspector of the Chicago, Burlington & Quincy, Lines East of the Missouri River, in June, 1904, and in January, 1910, went to Los Angeles.

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers. State the name and number of the bulletin or catalog desired, when mentioned in the description.

COLOR CHART.—"Protect and Decorate" is the title of a descriptive circular and color chart on Quigley Triple-A protective coating which has been issued by Quigley Furnace Specialties Company, 56 West Forty-fifth street, New York.

GRINDING MACHINES.—Universal tool and cutter grinding machines are described in the 20-page catalogue of the Norton Company, Worcester, Mass. The equipment and attachments supplied with complete machines are also listed and illustrated.

ELECTRIC TOOLS.—Drills, screwdrivers, nut-setters, grinders and flexible shaft outfits are described and illustrated in the catalogue of Ideal portable and stationary electric tools prepared by The Schauer Machine Company, Cincinnati, Ohio.

COMBINATION SHEARS AND PUNCHES.—Catalogue MC-30 issued by Henry Pels & Co., Inc., 90 West street, New York, describes and illustrates the outstanding features of Pels combination punches and shears and gives specifications for single purpose and combination punches; plate, angle, bar, billet, beam and scrap shears and copers.

ROLLED STEEL FLOOR PLATE.—"Stepping Out With Safety" is the title of an eight-page booklet issued by the Alan Wood Steel Company, Conshohocken, Pa., describing Diamondette rolled steel floor plate for use on car vestibule platforms, floors, steps and running boards, sills and baggage ladder steps, and other applications.

WELDING WIRE RESEARCH.—This is the title of a book which has been prepared by the Page Steel & Wire Company, 230 Park avenue, New York. Why ordinary wire will not do for welding, the effects of impurities on the finished weld and the testing of welded plate specimens are discussed. Facts concerning the use of a proper flame and a proper welding current are given in detail. The book also shows how to test welding wire by the flame test.

LATHES.—General catalogue No. 91-A has just been published by the South Bend Lathe Works, South Bend, Ind. The catalogue is a 108-page, two-color book and completely describes, illustrates and prices the 96 sizes and types of New Model South Bend precision lathes, with their tools and attachments. Information is given regarding lathe construction and the proper lathe to buy for the particular kind of work to be done, also data for the mechanic and shop owner and complete export information. The latter is given in the English, Spanish, Portugese, French and German languages.

GRINDING OF CEMENTED TUNGSTEN CARBIDE.—Some idea of the rates of cutting and of wheel wear involved in the grinding of cemented tungsen carbide may be obtained from the figures for typical operations given in the 28-page illustrated booklet entitled "Grinding of Cemented Tungsten Carbide" issued by the Norton Company, Worcester, Mass.

PHOTOMICROGRAPHY.—Simple and brief instructions for preparing iron and steel specimens for the microscope, together with an explanation of what the microscope shows, is included in a 15-page illustrated bulletin entitled "A. W. P. Welds Under the Microscope." The bulletin is being distributed by the Alloy Welding Processes, Ferry Lane Works, Forest Road, London, E 17, England.

SPRAY-PAINTING EQUIPMENT.—DeVilbiss railway paint shop and maintenance painting equipment is illustrated and described in the 30-page catalogue prepared by the DeVilbiss Company, Toledo, Ohio. The equipment is particularly adapted for painting coaches and buses, inside and out; freight cars; locomotives; bridges; buildings, etc. The equipment includes many types of spray-finishing outfits, car stencil outfits and ventilating equipment.

STARRETT ANNIVERSARY CATALOGUE.—The full line of Starrett tools, steel tapes, hacksaws and hacksaw frames are illustrated and described in the 382 page, fiftieth anniversary catalogue, No. 25, issued by the L. S. Starrett Company, Athol, Mass. Improvements on existing tools and many new tools put out since the publication of its previous catalogue are included in this anniversary book. Prices are also given.

ROLLER - BEARING CATALOGUE. — The American Roller Bearing Company, Pittsburgh, Pa., is distributing a new 76-page catalogue illustrating medium-duty, heavy-duty and super-heavy-duty bearings and many typical products in which the bearings are used. Drawings show various methods of installation in regard to end plate construction, doweling of inner races and control of thrust, also the usual methods of installing bearings in many kinds of equipment.

SCREW THREAD STANDARDIZATION, by W. E. Sharp. A four-page brochure, first prepared at the request of Columbia University and subsequently receiving wide distribution at other colleges and universities, which briefly sketches the history of screw thread standardization from April 21, 1864, when William Sellers, president of Franklin Institute of the State of Pennsylvania, read a paper on "A System of Screw Threads and Nuts," which was subsequently published in the Journal of the institute. The "Sellers" thread, which came to be known as the "U. S. Thread," came into general use through its wide adoption by American railroads and (1868) by the United States Navy. Following the World War, great impetus was given the system's development by the work of the National Screw Thread Commission (authorized by Congress, July 16, 1919—H R 10852), which interested itself particularly in greater precision and more sharply drawn lines of tolerance limitations with a view to greater interchangeability of bolted parts. Adoption of the Commission's report by the American Society of Mechanical Engineers, the American Railway Association, the Society of Automotive Engineers, etc., is mentioned. The history concludes with a brief description of the "Grip Nut" (invented 22 years ago), a lock nut which has full U. S. Standard threads, and whose locking power is built into it during manufacture by especially developed and improved automatic machinery. The author is of the opinion that the adoption of the American National Standard, recently promulgated by the National Screw Thread Commission, will give rise to some confusion, due to the multiplicity of wrench openings required in the concurrent use of the two standards, United States and American National, identical in thread form, but differing in external dimensions. The brochure is published by Grip Nut Company, 5917 South Western avenue, Chicago.

ARMCO INGOT IRON PLATES.—General and specific information on Armco ingot iron plates for a variety of purposes and examples of their service to the engineering world are contained in the 20-page catalogue issued by the American Rolling Mill Company, Middletown, Ohio.

ELECTRO-CHEMICAL CLEANING PROCESS.—The Bullard-Dunn electro-chemical cleaning process for the removal of scale, oxides and other foreign matter from the surface of metals without pitting, etching or hydrogen embrittlement is described in the eight-page bulletin issued by the Bullard-Dunn Process Division of the Bullard Company, Bridgeport, Conn. While the process was originally developed as a method of cleaning formed and hardened spring-steel bars, later polished and plated, which formed the important members of automobile bumpers, it is now used by manufacturers of drop forgings and in the fabrication of stainless steel or rustless iron.

MODERN REFRACTORY PRACTICE.—This is the title of an attractive catalogue of 178 pages issued by the Harbison-Walker Refractories Company, Pittsburgh, Pa. There are thirteen chapters in the catalogue, the first five of which describe fireclay, high-alumina, silica, magnesite and chrome refractories. Special clays, high-temperature cements and Duro acid-proof brick and tile are then discussed. Following these chapters are brief reviews of the application of Harbison-Walker products in a number of important types of industrial furnaces; tables for use in estimating the quantities of brick required for circular linings, roofs and arches; formulae for calculating brickwork; general information, and a glossary of terms commonly used in the refractories industry. The material is presented in a simple, non-technical manner.